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AMERICAN JOURNAL OF OPHTHALMOLOGY
VOLUME 17 DECEMBER, 1934 NUMBER 12

PHYSIOLOGICAL CONSIDERATIONS IN THE TREATMENT OF PULSATING EXOPHTHALMOS

GEORGE M. DORRANCE, M.D.
AND
PAUL E. LOUDENSLAGER, M.D.
PHILADELPHIA

The authors agree that this term should rightly be restricted to that type which is due to vascular lesions of vessels closely associated with the orbital supply of blood; it is most often due to an arterio-venous communication between the internal carotid artery and the cavernous sinus. The physiological and pathological considerations involved in the management of pulsating exophthalmos include the mechanism of the carotid sinus, the rôle of the sympathetics, the factors of thrombosis and of embolism, and the anatomical details of collateral circulation.

Treatment by ligation of the common carotid artery, subsequently by ligation of the external carotid, reduces the flow in the internal carotid by 50 percent and 75 percent, respectively. When the pressures within the internal carotid are not reduced too greatly there is no tendency to reversal of blood flow from the distal portion of the carotid backward through the fistula. The reduction of the blood flow is followed by contraction of the lumen of the vessel and favors the reduction in the size of the fistula.

Drainage of operative wounds in the neck is specially considered for the avoidance of operative complications.

Read before the Association for Research in Ophthalmology, in Cleveland, June 12, 1934.

Since Keller first contended that the term pulsating exophthalmos should be limited to that condition in which a communication exists between the internal carotid artery and the cavernous sinus it has been accepted that such diagnosis implies vascular disease or injury of the vessels closely related to the orbital blood supply.

Autopsy and operative observations reveal that the lesion is not always within the confines of the cavernous sinus but many consist of an arterio-venous aneurysm of the orbit, a simple aneurysm of the ophthalmic artery, or of the intracranial but extracavernous internal carotid. Several cases also have been reported in which there existed a fistula between the internal carotid and the internal jugular at the entrance of the carotid canal. That the most common cause of the symptomatology is a fistula between the internal carotid artery and the cavernous sinus is evidenced by the fact that such lesions were found in fourteen of the sixteen autopsies in the cases we have studied and that in three of these, bilateral fistulae were demonstrated.

Inasmuch however as the term is descriptive of two cardinal signs of the symptom complex, namely exophthalmos and pulsation of the orbital contents, cases presenting these two phenomena continue to be reported under this title. A study of case histories reveals that many cases so reported are obviously not cases of pulsating exophthalmos within the original definition of the term.

From a diagnostic standpoint, it is necessary that every condition be known in which the picture is presented in whole or part. From the standpoint, however, of evaluation of therapeutic measures it is necessary to group cases according to the pathological processes responsible for the syndrome. The value of any procedure such as carotid ligation cannot be estimated when it is used in an attempt to cure an exophthalmos due to congenital absence of an orbital

Fig. 1

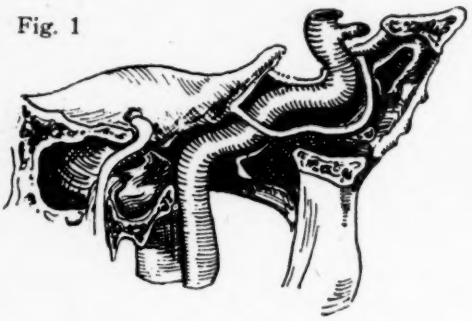


Fig. 2

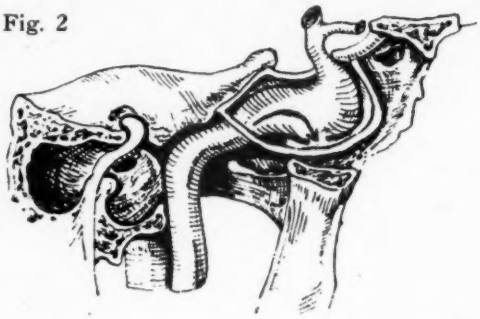


Fig. 3

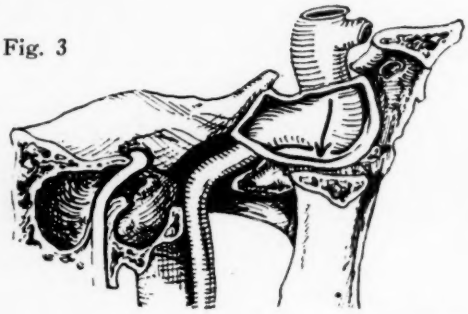


Fig. 4

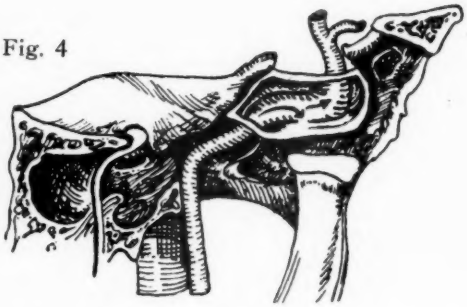


Fig. 5

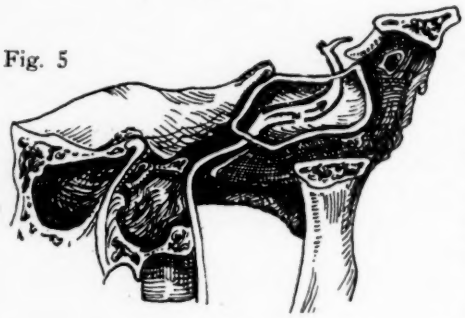


Fig. 1 (Dorrance and Loudenslager). Internal carotid artery in cavernous sinus.

Fig. 2 (Dorrance and Loudenslager). Arterio-venous fistula between internal carotid and cavernous sinus. The artery at the site of the fistula is dilated, the sinus is dilated, and the artery distal to the sinus is contracted.

Fig. 3 (Dorrance and Loudenslager). Conception of conditions following ligation of internal carotid. Proximal artery contracted. Distal artery dilated with recurrent flow of blood, keeping fistula active.

Fig. 4 (Dorrance and Loudenslager). Conception of conditions following ligation of common carotid artery. Internal carotid contracted through entire extent and continuing to carry blood from below upward.

Fig. 5 (Dorrance and Loudenslager). Conception of conditions following ligature of common carotid artery and superior thyroid. Internal carotid contracted but continuing to carry a current of blood.

wall. Such a case is reported by Moore, and the ligation included in several tabulations.

We have attempted to find and study the original reports of all cases in which a diagnosis of pulsating exophthalmos was made and reported subsequent to the classic analysis made by deSchweinitz and Holloway in 1908. Of these, a tabulation has been made of two hundred and seventy-five cases in which it seemed reasonably certain that the etiology was of a vascular nature. We have included in this tabulation four of our personal cases which time does not permit reporting in detail and two other cases which we have seen lately, one from Dr. Fred A. Bothe's and one from Dr. Wm. Francis Whelan's practice, both of which are to be reported later.

As we are here concerned with the physiological basis for treatment of this condition, we shall omit discussion of its etiology, the anatomical reasons for the development of its various features, and its differential diagnosis, and confine our remarks to an analysis of what has been accomplished towards its control, and offer a physiological concept for the management of an arterio-venous aneurysm of the intracranial internal carotid artery.

Of the 275 cases included in this

analysis, symptoms are designated as developing spontaneously in 55, while in 220 the symptoms were secondary to traumata to the head.

Of the 55 so-called spontaneous cases, advanced arterial disease was seen in most, together with other debilitating conditions common in those of advanced years. It is not surprising, therefore, to find that of these 55, eight died either without treatment or in spite of treatment. In addition, the deaths of seven others were hastened by surgical intervention. Certainly in these cases the axiom is true that each case is a law unto itself and no routine type of treatment can be applied indiscriminately.

Beyond the medical measures, including carotid compression, gelatin injections, and local compresses to the eyes, surgical intervention has consisted almost exclusively of ligations of orbital veins or ligations of the internal or common carotid arteries.

Among 46 cases in which no treatment is reported, spontaneous relief took place in 13; in 25, the future of the patient was not noted; in five, symptoms and signs persisted for periods ranging from 20 to 65 years; and in three, death intervened before any treatment was instituted.

Among 15 cases in which drugs only were administered, chiefly the iodides, there was not one cure, but in 13 improvement was observed, while in two there was no change.

In 13 cases in which no other treatment was given except systematic compression of the carotid artery, recovery took place in five, improvement in three, and no change in five.

Of fifteen patients who received gelatin injections exclusively, five were cured; one was improved; while nine were unaffected.

Although these records of improvement and cure cannot be dismissed on the grounds of coincidence, the almost routine use of carotid compression and medication, prescribed preoperatively in many cases for months without effect, does not incline one to place much confidence in their efficacy.

Eleven patients received no other surgical treatment except ligation or excision of orbital veins. Of these, three were cured, but it should be noted that in two of these the lesions were within the orbit. In two others, improvement is claimed although in one of these blindness resulted and head noises persisted. In the remaining six, the eye condition was unchanged or made worse.

In 12 cases, orbital-vein ligation was practised simultaneously with ligation of the common carotid. Four of these resulted in cures, with complications, however, of three serious hemorrhages and one enucleation; in four others there was improvement with one resultant case of blindness. In one there was no effect. Of the three deaths, two were the result of the orbital operation, while one was probably due to the carotid ligation.

In 15 cases the orbital veins were ligated secondarily, that is, after failure of, or recurrence after, common or internal-carotid ligations. In these 15, the five cures were complicated by one cavernous-sinus thrombosis and panophthalmitis, and one hemiplegia. The three improvements were marred by one glaucoma and enucleation. In four cases there were no beneficial effects, and of the three deaths, two were due to the orbital interference and the third to meningitis secondary to infection of the eyebrow wound.

In the total of these 38 cases, we see only 12 cures, four of which were prob-

Table 1

CASES TREATED NONSURGICALLY

	Totals	Cured	Improved	Unchanged	Deaths	Outcome not noted
Medical	15	0	13	2		
Carotid Compression	13	5	3	5		
Gelatin Injections	15	5	1	9		
No treatment	46	13		5	3	25
Totals	89	23	17	21	3	25

ably due to the simultaneous ligation of the common carotid, while in two others the lesions were intraorbital. Nine were improved while eleven were not affected. Of the six deaths, one was probably due to the carotid ligation and one to an accidental wound infection.

A total of four deaths, two enucleations, six blind eyes, and three serious orbital hemorrhages directly chargeable to the orbital attack seems too high a price to pay for a procedure which shows only twenty percent of cures in 38 cases.

Forty-four ligations of the internal carotid alone resulted in 25 cures; eight patients were improved, nine were temporarily improved but suffered a recurrence, and two were unchanged.

Combination or multiple ligations resulted in six patients cured, three improved, and four others improved but experiencing a recurrence.

When the ligation was secondary, after failure of the common-carotid or orbital-vein ligations, there were five cures; four patients were improved, and three not affected.

In the total of 69 cases, there were four deaths directly attributable to the obliteration of the internal carotid, and 13 cases of hemiplegia, four of which were permanent; three patients recovered only slowly, while six were transient.

Seventy-one ligations of the common carotid alone resulted in 37 cures; 12 patients showed improvement, 10 were improved temporarily but had a recurrence; and in 12 there was no effect.

When ligation was simultaneous with that of the internal jugular vein or with orbital veins the result in four cases was a cure; in one, a recurrence; and in one, failure.

In two cases ligation was secondary after failure of orbital-vein ligations, and the result in one was cure, in the other, failure. In the total of 82 ligations, there were four deaths for which the ligation seemed directly responsible, but only six hemiplegias, and only one of these was more than transient.

The multiplicity of procedures used in most cases renders it almost impossible to present adequate conclusions in the form of a table.

The record of orbital-vein ligations condemns the operation as exceedingly dangerous both to vision and life.

Its rationale is based upon the false premises that increased resistance on the venous side of an arterio-venous fistula will cure the fistula, or that orbital-venous obstruction will induce thrombosis at the site of any fistula.

An examination of the records indicates that any thrombosis is to be looked upon as a complication and to be guarded against with the greatest care. This applies both to orbital operations and to procedures upon the carotid vessels. In two cases after orbital-vein ligation, autopsies revealed that death resulted from thromboses extending beyond the cavernous sinus into other cranial sinuses. It has very likely been the cause of other deaths not determined by autopsy. This danger of thrombosis is the greatest objection to orbital-vein ligations. It also condemns the gelatin injection, in which the entire purpose is to induce thrombosis. It is our objection to the Brooks procedure of introducing a muscle-tissue embolus into the internal carotid artery, with the object of having it lodge in the fistula and close the communication. Muscle tissue is rich in coagulating substances, and such an embolus should be feared as provocative of a cavernous-sinus thrombosis which might not remain limited to that sinus. While brilliantly conceived and beautifully executed by Brooks, I cannot help saying that I should object to having

Table 2

RESULTS FROM ORBITAL-VEIN LIGATIONS

	Totals	Cured	Improved	Unchanged	Deaths
Alone	11	3	2	6	0
Combined	12	4	4	1	3
Secondary	15	5	3	4	3
Totals	38	12	9	11	6

muscle tissue introduced into my own internal carotid artery.

The surprise of this analysis consists in finding that ligations of the common carotid and of the internal carotid arteries closely approximate each other in the records of benefits obtained, only a slightly greater preference being apparent with the common-carotid ligations. There were a few more recurrences after the internal ligations than after those of the common and the same number of deaths in 69 internal-carotid ligations as in 82 common-carotid ligations, but these differences are so small as to be of little value for comparison. A great difference is noted, however, in the number of complications. After the 82 common-carotid ligations, hemiplegia occurred only six times, not once being permanent and only once being more than transient. In the 69 internal ligations, on the other hand, hemiplegia occurred 13 times, four times being permanent, three times prolonged with slow recovery, and six times temporary.

Table 3

RESULTS FROM INTERNAL-CAROTID LIGATIONS

	Totals	Cured	Improved	Recurrent	No effect
Alone	44	25	8	9	2
Combined	13	6	3	4	0
Secondary	12	5	4	0	3
Totals	69	36	15	13	5

Aside from the spontaneous cases in those of very advanced years, only one death followed ligation of the common carotid and only one after ligation of the internal carotid. This low mortality bears evidence against the belief that ligation of the carotid artery for pulsating exophthalmos involves the danger of causing death by anemia of the brain. Rather does it confirm the statements of Shaw and Trotter and the demonstrations of Holman that "an arterio-venous aneurysm is a greater stimulant to the development of collateral channels than is obliteration of the artery."

Unlike the extremities and most of the organs of the body which depend for their nutrition upon one main artery, the brain is abundantly supplied by four great vessels, each originating in the high-pressure areas of the aortic arch and of the subclavian vessels. No part of the body seems so efficiently protected against failure of blood supply as the brain.

Each internal carotid equals the basilar in diameter, and it would be more correct, probably, to say that the brain is supplied by only three main vessels and that the obliteration of one carotid should reduce the volume flow to the brain by one third. The exact amount of reduction in any given patient would be difficult to estimate, as compensatory dilatation of the collateral channels is very prompt.

The relatively greater volumes, however, carried by the carotids should be borne in mind when and if anyone contemplates such an undertaking as bilateral ligation of the common or internal carotid. In spite of the few successful bilateral ligations in the literature, it is not a rational procedure. The reduction by two thirds of the volume flow to the brain is too great to be successfully compensated by the otherwise generous collateral provisions with

Table 4

RESULTS FROM COMMON-CAROTID LIGATIONS

	Totals	Cured	Improved	Recurrent	No effect
Alone	71	37	12	10	12
Combined	9	5	0	1	3
Secondary	2	1	0	0	1
Totals	82	43	12	11	16

which the brain is supplied. In eleven bilateral ligations, we find one death, the loss of mentality in four cases and permanent hemiplegias in two others. The importance of the opposite carotid, moreover, should not be lost sight of in unilateral ligations. Homans and Guinard sounded this warning after each ligated a common carotid, performed an autopsy on their patients, and found only weakly developed and poorly functioning vessels opposite the ones they ligated. There is, furthermore, no anatomical reason for ligation of the opposite carotid when the lesion is unilateral. So far as the fistula is benefited, it is most likely that the effect of the opposite ligation is due to the decrease in the blood volumes crossing the midline into the original internal carotid.

We see then that ligation of the internal carotid, or of the common carotid, or of the common carotid with subsequent ligation of branches of the external, of the external trunk itself, or of the internal has been the most consistently satisfactory attack upon an arterio-venous communication between the internal carotid artery and the cavernous sinus. Pemberton remarks that "It is difficult to understand how such cures are effected," inasmuch as "the operation consisting of ligating the proximal artery alone is contraindicated in arterio-venous aneurysms elsewhere in the body." In the extremities, the proximal ligation of an artery for arterio-venous fistula is a procedure which is associated with grave danger of immediate gangrene.

A consideration of the circulatory adjustments and physiological reactions, consequent upon the establishment of an arterio-venous fistula together with those which follow ligations of the common or internal carotid arteries may assist us to an understanding of the principles governing these ligations.

Among the local effects of the presence of an arterio-venous fistula is a dilatation of the segment of artery proximal to the fistula. When large volumes of blood escape through the fistula, an ever-increasing quantity follows that course of least resistance. The effect upon this proximal artery is one of dilatation and hypertrophy, an effect which Hodgson explains as that property by which the size of arteries becomes adapted to the parts they supply. Inasmuch as this dilatation is a progressive affair, a vicious circle is established. A diversion of blood from the general circulation into the short circuit is compensated by a progressive increase in total blood volumes, which, in turn, adds further distending force to the proximal artery and to the fistula.

A second effect upon the artery in which the fistula is present is a contraction of the segment distal to the fistula. This is due, of course, to the decreased quantity of blood traversing that segment. The losses through the fistula both of volume and of pressure are so great that relatively small quantities go beyond the fistula. The amount would depend upon the size of the opening.

Dilatation of this segment distal to the fistula has been recorded on several rare occasions. Callander noted its enlargement in three of 447 cases reported. Holman has produced it experimentally and has explained its production as follows: "In the healing that occurs after an injury the lumen proximal to the fistula may become constricted." Now if the fistula remains open, blood by way of the collateral circulation pours into the segment of artery distal to the constriction because an area of diminished resistance obtains in this segment. Increasing volumes of blood pouring into this distal segment would inevitably lead to a dilatation of this distal artery. The same results obtain if the vessel is ligated proximal to the fistula, or if the fistula be large. In the latter case, the volume of blood the opening can accommodate is larger than the amount supplied by the afferent artery and additional volumes are attracted backwards from distal channels.

Having in mind this adaptability of vessel walls to the volumes of blood carried by them, several probabilities warrant consideration.

The first is that when the internal carotid artery is ligated, in the presence of an internal carotid-cavernous sinus fistula, a reversal of blood flow in the distal artery may account for the cerebral symptoms seen after such liga-

tions. Such a reversal would be governed by two factors—first, the amount of suction produced by the fistula, and second, the contractility of the vessel wall. In the presence of a large fistula, increased suction may have effected a reversal prior to the ligation, while in older people with rigid vessels contraction would be prevented. In either case, cutting off the blood supply in the neck would turn the full force of the suction to the distal vessels and drain large quantities of blood from the brain too rapidly to be counterbalanced by the otherwise adequate collateral supply.

sive enlargement of the proximal artery enlarges the fistula, and increasing size of the fistula attracts further distending volumes into the proximal artery. Cutting down the size of the artery by decreasing the volumes of blood it carries should decrease the size of the fistula. With progressive lessening of the volumes transported by the proximal artery, obliteration of its lumen could conceivably reduce the size of the fistula sufficiently so as to approximate its edges and permit union.

Such fractional ligation of an artery, not possible in the extremities, is fea-

Left: Fig. 6 (Dorrance and Loudenslager). Original ligature on common carotid. Recurrent flow from branch of external, down the external, past the bifurcation and up the internal.

Center: Fig. 7 (Dorrance and Loudenslager). Ligation of common carotid and superior thyroid. Current in internal carotid reduced 75 percent.

Right: Fig. 8 (Dorrance and Loudenslager). Ligation of common carotid, superior thyroid, and occipital, almost completely but not entirely obliterating current in internal carotid.

On the other hand an elastic distal segment which has become contracted would be expected to present a certain amount of resistance to redilatation. Suction by the fistula would need to be increased, therefore, sufficiently to overcome this resistance to dilatation before any marked backflow would occur.

Now were it possible to reduce the blood volumes in the internal carotid only partially, is it not probable that such partial reduction might be accomplished without precipitating a reversal of flow in the distal segment? Such management would result in a reversal of the vicious circle, in which progressible with the internal carotid because of the fact that ligation of the common carotid only partially controls the flow in the internal. Since Blackman commented upon it in 1855, the reversal of the current in the external carotid after ligation of the common and the resultant continuance of flow in the internal has been a recognized fact. It does not seem, however, to have received widespread publicity nor to have had its implications fully appreciated. We had never heard it discussed and thought that we had seen something new when we first demonstrated it to our own satisfaction.

Reopening a neck three weeks after

ligating a common-carotid artery we found the internal and external pulsating above the obliterated common. By clamping and using various combinations of the clamps in the positions indicated, the blood current was seen to be flowing, under good pressure down the external, past the bifurcation, and up the internal, with a contraction of about one third to one half in the size of the internal.

An examination of the literature revealed that other men have observed the same phenomenon.

In attacking an arterio-venous fistula of the left carotid jugular tract at the bifurcation, Matas placed an aluminum band on the common carotid and another on the internal jugular vein just above the clavicle. Reopening the wound sometime later, he found the fistula still active and fed by an arterial current coming down the external carotid into the internal and through the fistula into the jugular. Placing clamps upon the internal and external carotids and upon the internal jugular above the fistula, he performed an endo-aneurysmorrhaphy, removed the clamps, and found the circulation down the external and into the internal soon reëstablished.

Lenormant comments upon an operation in which he assisted Petit-Dutaillis to resect an aneurysm of the bifurcation with an immediate end-to-end anastomosis of the stump of the external carotid with that of the internal carotid. He remarks that in the course of the operation the clamp slipped off the internal carotid and he was surprised to see practically no bleeding, indicating a very small pressure down the internal carotid. After reunion of the two vessels, good pulsations were immediately established in both vessels. There were no cerebral complications, and one year later, he found good pulsation in both vessels.

Margarucci noted that the internal was reduced in size six months after ligation of the common carotid and that the bulk of the flow in the internal came from the external.

Keegan estimated in his cases that the internal was only about half its original size two months after ligation of the common.

Dawbarn remarks that "It is known to everyone that there are thousands—myriads—of nameless little vessels interlocking at the median line by which the freest anastomoses are quickly restored."

The retrograde flow from the anastomoses of the external carotid down the external, past the bifurcation, and into the internal, has been recognized by thirty authors whose writings have been brought to our attention.

We have studied this phenomenon in ten cases since we first observed it three years ago and as a result have arrived at the following rough estimations: (1) Following ligation of the common carotid the internal becomes a branch of the external and the volume flow in the internal carotid is reduced by about 50 percent. (2) Almost one half of the recurrent flow in the external carotid comes through the superior thyroid.

As a general rule, we believe it wise to ligate the common carotid alone, thus reducing the flow in the internal by one half. Evidence is ample in the literature that this is frequently sufficient to cure.

In selected cases, a greater reduction may be practicable at the first stage. Thus Bothe ligated the common carotid of the superior thyroid, cutting off 75 percent of the flow in the external carotid at one operation and obtained a complete cure without further intervention.

It has been our practice to ligate the common primarily. If then there be persistence of symptoms or a recurrence, the neck is reopened and the superior thyroid and the occipital are ligated. Later the external trunk itself may be ligated, although we have not found it necessary to open the neck more than twice.

Keegan, Margarucci and Des Cherf have ligated the internal immediately after it became apparent that the ligation of the common was insufficient to control the leak. They obtained good results and it is likely that other cases can be managed successfully in the same manner.

A larger percentage of successes, however, with fewer complications, we believe, will be obtained if the physiological principles here outlined are observed. There are several reasons for

this: first, with a slower reduction of blood volumes in the internal carotid, there is less likelihood of starting a back-flow from the artery distal to the fistula; second, any volume of blood which is reaching the brain through this internal carotid is preserved proportionately; third, the existence in the bifurcation of the common-carotid artery of the important structure known as the carotid sinus, a mechanism of nerves delicately sensitive to changes in intramuscular pressure in the bifurcation as well as to mechanical pressures from without. This carotid sinus seems to be particularly concerned with regulating the circulation to the brain where adequate intravascular pressures are more important than in the extremities. Compression of the sinus or a rise of pressure within the sinus produces a slowing of the heart rate and reduction of blood pressure. Removal of stimulation to the sinus results in a reversal of these phenomena and we see an increase in heart rate and increase in blood pressure. It is obvious, therefore, that ligation of the internal carotid with a building up of pressures back of the ligature in the bifurcation and the consequent retardation of the heart and reduction of blood pressure would contribute to and accentuate any deficiency of cerebral blood supply.

Ligation of the internal carotid, therefore, in the presence of an arteriovenous fistula in the cavernous sinus is contraindicated for the following reasons: (1) It is seen to have been complicated by a high incidence of hemiplegias. (2) Its ligation completely cuts off any blood volumes which may be getting past the fistula and reaching the brain. (3) It creates an area of low resistance at the site of the fistula and thereby stimulates a reversal of flow in the segment of vessel distal to the fistula. Such reversal of flow, by draining large quantities of blood from cerebral channels could explain the cerebral complications which follow such ligations. (4) It creates increased pressure within the carotid sinus, where increased pressures have the effect of lowering blood pressures and slowing the heart action. Such a sudden and extreme fall in intravascular pressures could result in thrombosis of cerebral vessels with resultant hemiplegia or death.

Ligation of the common carotid, on the other hand (1) shows a minor incidence of complications in the form of hemiplegia as compared with ligation of the internal carotid. (2) It reduces the blood flow in the internal carotid by about 50 percent only, so that in effect the internal becomes a branch of the external, and in certain cases may be an important channel of collateral circulation to the brain. (3) Because of the reflux from the external into the internal, it becomes possible to carry out a truly fractional ligation of the internal carotid, which may conceivably make it possible to reduce the flow through a fistula between the internal carotid and the cavernous sinus without stimulating a reversed flow from the distal segment. (4) It reduces pressure within the carotid sinus, creating thereby impulses which raise blood pressures and increase the heart rate, which, in turn, tends to prevent or overcome slowing of the circulation in cerebral areas.

The problems of thrombosis and embolism as related to these ligations, the rôle of the sympathetics, the anatomical details of collateral circulation, and the production of cerebral complications we have discussed elsewhere, and time does not permit of their repetition here.

A broad study of all phases, however, would indicate that (1) The routine systematic compression of the carotid vessels preoperatively and the use of fascial bands or rigid clamps such as those of Matas or Neff may contribute to the incidence of postoperative complications. (2) The simultaneous ligation of the internal jugular vein is more apt to be detrimental than helpful. (3) In the presence of any mouth or nose or throat infection, the operative wound in the neck should be drained. (4) Anomalies of the circle of Willis are so rarely uncompensated that deficiency of collateral circulation because of them cannot explain all of the cerebral complications which follow ligation of the carotid vessels. (5) Cerebral accidents following these ligations are largely due

to sudden extreme reductions in blood pressures, resulting in stagnation of the blood stream in cerebral areas.

Conclusions

An arterio-venous communication between the internal carotid artery and the cavernous sinus should be expected to exhibit the same phenomena of hemo-dynamics observed in arterio-venous communications elsewhere in the body.

On the basis of such expectation, ligation of the proximal artery—in this situation, the internal carotid—would produce a reflux of blood from the artery distal to the fistula, keeping active the fistula and possibly causing cerebral complications.

Ligation of the common carotid, on the other hand, should be recognized as a partial ligation only of the internal. Because of the reversal of flow in the external, the internal becomes a branch of the external with about fifty-percent reduction in volume flow.

Fractional ligation of the internal carotid in this manner presents a more satisfactory record chiefly from the standpoint of fewer cerebral sequelae. We submit that this may be accounted for by the probability that the partial reduction in blood pressure in the internal carotid is insufficient to start a backflow from the distal artery. And, further, if this backflow does not occur, the vessel will shrink in size, reducing its lumen and thereby reducing the size of any fistula present.

2101 Spruce Street.

References

Albertin and Desgouttes. Le Jour. Med. Franç., 1909, v. 3, p. 453.
Arcelin. Zentralbl. f. d. ges. Ophth., 1926, v. 15, p. 136.
Arganaraz, and Delfor del Valle. Rev. Asoc. Méd. Argent., 1919, v. 30, p. 377.
Ajtay. Ztschr. f. Augenh., 1924, v. 53, p. 139.
Auerbach, M. I. Zentralbl. f. d. ges. Ophth., 1925, v. 14, p. 253.
Augstein, H. Klin. Monatsbl. f. Augenh., 1916, v. 56, p. 484.
Bach, E. C. Wisconsin Med. Jour., 1931, v. 30, p. 636.
Baer, B. F., Jr., and Adler, F. H. Surg. Clin. N. Amer., 1931, v. 11, p. 1349.
Balbeuna, J. F. Arch. de Oftal. Hispano-Amer., 1913, v. 13, p. 72.
Barbieri, A. Arch. de Oftal. Hispano-Amer., 1909, v. 9, p. 9.
Barco, P. Rev. de Cir. Buenos Aires, 1929, v. 8, p. 481.
Bardanzello, T., and Vallebona, U. Arch. di Ottal., 1931, v. 38, p. 342.
Baroni-Benigno. Arch. Ital. di Chir., 1925, v. 14, p. 225.
Barrett, J. W., and Orr, W. F. Intercolon. Med. Jour. Australasia, 1909, v. 14, p. 492.
Battaglia, M. Arch. Ital. di Chir., 1922, v. 5, p. 690.
Baurmann, M. Ber. der Ophth. Gesellsch. Heidelberg, 1930, v. 48, p. 291.
Bedell, A. J. Arch. of Ophth., 1915, v. 44, p. 139; Amer. Jour. Ophth., 1918, v. 1, p. 311.
Behan, J. L. N.Y. State Jour. Med., 1921, v. 21, p. 373.
Bell, G. N. Arch. of Ophth., 1919, v. 48, p. 84.
Bettremieux. Ann. d'Ocul., 1909, v. 142, p. 28.
Bielschowsky. München. med. Wchnschr., 1919, v. 66, p. 700.
Bigoni, A. Policlinico, 1927, v. 34, p. 142.
Birley. Brain, 1928, v. 51, p. 184.
Blackman. Amer. Jour. Med. Sci., 1848, v. 15, p. 357.
Bohm, F. München. med. Wchnschr., 1929, v. 76, p. 51.
Bonnamour, and Bujadoux, and Lyonnet, R. Lyon Med., 1927, v. 139, p. 463.
Boot, G. W. Illinois Med. Jour., 1918, v. 34, p. 217.
Bothe, F. A. Personal communication.
Bourguet, and Mireaux. Toulouse Med., 1909, v. 11, p. 104.
Brazeau, S. D. California State Jour. Med., 1915, v. 13, p. 406.
Brobeck, Von H. Amer. Jour. Ophth., 1932, v. 15, p. 1054.
Brock, S. Med. Clin. N. Amer., 1929, Nov., v. 13, p. 667.
Brøns, I. Amer. Jour. Ophth., 1928, v. 11, p. 586 (abstracted).
Brooks, B., and Pilcher, C. Personal communication.
Bruce, A. Rev. Neurol. and Psychiat., 1908, v. 6, p. 462.
Bruun, H. Ugesk. f. Laeger, 1923, v. 85, p. 472.
Buchtel, F. C. Ophth. Rec., 1913, v. 22, p. 75.
Buettner, G. Beit. z. klin. Chir., 1925, v. 133, p. 512.
Buxton, St. J. D. Lancet, 1927, v. 1, p. 1081.
Caillaud. Arch. d'Opht., 1916-17, v. 35, p. 746.
Callander, C. L. Ann. Surg., 1920, v. 71, p. 428.
Campbell, J. L. Southern Med. Jour., 1928, v. 21, p. 540.
Campbell, and Martin. Jour. Amer. Med. Assoc., 1932, v. 99, p. 1683.

Cantonnet, A. Arch. d'Opht., 1914-15, v. 34, p. 583.
Carlotti. Ann. d'Ocul., 1908, v. 139, p. 450.
Cauchoix, A. Rev. de Chir., 1921, v. 59, p. 197.
Bull. et Mem. de la Soc. de Chir. de Paris, 1922, v. 48, p. 20.
Cotterill, J. M. Edinburgh Med. Jour., 1910, v. 5, p. 54.
Crocco, A. Semana Méd., 1926, v. 33, p. 1075.
Damel, C. S., and Barrios, M. R. Amer. Jour. Ophth., 1919, v. 2, p. 250.
Damsgaard, S. Ugesk f. Laeger., 1915, v. 77, p. 20.
Danis. Zentralbl. f. d. ges. Ophth., 1925-26, v. 15, p. 136.
Dawbarn, R. H. M. Treatment of malignant growth. Philadelphia, 1908, Davis.
de Lapersonne, F., and Sendral. Arch. d'Opht., 1920, v. 37, p. 8.
Delore, X., Aurand, L., and Rolland, H. Lyon Med., 1926, v. 138, pp. 61 and 170.
Demaria, E. B., and Jorge-Jose, M. Arch. de Oftal. Hispano-Amer., 1922, v. 22, p. 472.
De Peyrelouque, E., and Bauer, F. Arch. d'Opht., 1926, v. 43, p. 684.
Descarpentries. Bull. de la Soc. cent. de Med. Nille, 1908, p. 501.
Des Cherf. Bull. et Mém. Soc. d. Chir. d. Paris, 1923, v. 29, p. 289.
deSchweinitz, and Holloway. Pulsating exophthalmos. Phila., W. B. Saunders Co., 1908. Trans. College of Phys. Phila., 1916, v. 38, p. 341.
de Treighy, M. Arch. d'Opht., 1921, v. 38, p. 568.
Dodd, R. C. Arch. of Ophth., 1930, v. 3, p. 656.
Dorrance, G. M. Amer. Jour. Ophth., 1930, v. 13, p. 8.
———. Ann. Surg., June, 1934.
Dupuy-Dutemps, L. Bull. Soc. d'Opht. de Paris, 1927, v. 3, pp. 136-143.
Duverger, M. Rev. d'oto neuro-ocul. de Strasbourg, 1923, v. 1, p. 547.
Ehlers-Holger. Acta Psychiatrica et Neurologica, 1929, v. 4, p. 151.
Eliot, Ellsworth, Jr. Ann. Surg., 1912, v. 55, p. 454.
Elschnig, A. Arch. f. Ophth, 1916-17, v. 92, p. 101.
Erggelet. München. med. Wchnschr., 1920, v. 67, p. 412.
Estaban, M. Arch. de Oftal. Hispano-Amer., 1928, v. 28, p. 369.
Eve, F. Proc. Roy. Soc. Med., Clinical Section, 1909-10, v. 3, p. 77.
Fenton, R. A. Amer. Jour. Ophth., 1922, v. 5, p. 802.
Ferrero, V. Arch. Ital. di. Chir., 1921, v. 3, p. 405.
Feruglio, A. Riforma Med., 1913, v. 29, p. 107.
Fisher, J. H. Proc. Roy. Soc. Med., 1915-16, v. 93, p. 25.
Fleming, and Johnson. Trans. Royal Soc. Med., Clinical Section, 1908-09, v. 2, p. 14.
Franke. Deutsch. med. Wchnschr., 1917, v. 43, p. 159.
Fritsch, H. Ztschr. f. Augenh., 1917, v. 38, p. 186.
Frund, H. Beitr. z. klin. Chir., 1928, v. 142, p. 221.
Fry, A. P. St. Bartholomew's Hosp. Jour., 1910-11, v. 18, p. 40.
Gazepis. Arch. f. Ophth., 1922, v. 110, p. 375.
Geigy, K., and Basel, F. Inaug. Diss. Basel, 1931.
Gibson, J. L. Med. Jour. Australia, 1918, v. 2, p. 203.
Ginzberg, J. Klin. Monatsbl. f. Augenh., 1912, v. 50, p. 698.
Gomez. Brasil-Med., 1921, v. 34, p. 202.
Gresser, E. Amer. Jour. Ophth., 1931, v. 14, p.1058.
Grimsdale, H. Proc. Roy. Soc. Med., 1919-20, v. 13, p. 37.
Guinard, A. Ann. d. Mal. de l'Oreille, du Larynx, 1896, v. 22, p. 393.
Haebler. München. med. Wchnschr., 1928, v. 75, p. 381.
Hallett, de W. Amer. Jour. Ophth., 1921, v. 4, p. 203; 1928, v. 11, p. 710.
Halstead. Surg. Gynec. Obs., 1911, v. 12, p. 298.
———, and Bender. Surg. Gynec. Obs., 1910, v. 10, p. 55.
Hamburger, L. P. Amer. Jour. Med. Sci., 1931, v. 181, p. 756.
Hamby, W. B., and Gardner, W. J. Arch. Surg., 1933, v. 27, p. 676.
Hanford, J. M., and Wheeler, J. M. Ann. Surg., 1930, v. 92, p. 8.
Hanford, J. M. Ann. Surg., 1931, v. 94, p. 465.
Harkness. Internat. Jour. Med. Surg., 1930, v. 43, p. 243.
Harman, N. B. Proc. Roy. Soc. Med., 1923-24, v. 173, p. 3.
Hartshorne, I. Amer. Jour. Ophth., 1921, v. 4, p. 353.
Hay, P. J. Trans. Ophth. Soc. U. Kingdom, 1925.
Hennig, Otto. Beitr. zur klin. Chir., 1930-31, v. 151, pp. 132-139.
Hepburn, M. L. Proc. Roy. Soc. Med., 1919-20, v. 13, p. 31.
Herzau. Klin. Monatsbl. f. Augenh., 1930, v. 84, p. 553.
Hildebrand. Aerztl. Sachverst. Zta., 1912, v. 18, p. 10.
Hilgartner, H. L., and Watt, W. E. Amer. Jour. Ophth., 1931, v. 14, p. 339.
Hird, B., and Haslam, W. F. Lancet, 1909, v. 1, p. 462.
Hitzrat, J. M. Ann. Surg., 1925, v. 82, p. 662.
Holman, E. Arch. Surg., 1929, v. 18, p. 1672.
Homans, J. Ann. Surg., 1920, v. 71, p. 707.
Hopkins, G. H. Amer. Jour. Ophth., 1932, v. 15, p. 54.
Huddy, S. P. B. Lancet, 1928, v. 2, p. 541.
Ipsen. Hospitalstid., 1912, v. 5, p. 1009.

Isupow. Ztschr. f. Augenh., 1909, v. 21, p. 534.
Jacques. Rev. de Laryngol., 1908, v. 28, p. 72.
Jaensch, P. A. Klin Monatsbl. f. Augenh., 1924, v. 73, p. 251.
James, R. R., and Fedden, W. F. Lancet, 1912, v. 2, p. 237.
Jennings, E. S. Jour. Amer. Med. Assoc., 1927, v. 88, p. 1790.
Josefson, A. Hygeia, 1929, v. 91, p. 545.
Kattan, M. Bull. Ophth. Soc. Egypt, 1932, v. 25, p. 171.
Keegan, J. J. Surg. Gynec. Obs., 1933, v. 57, p. 368.
Keller. Inaug. Diss., Zürich, 1898.
Kerr, H. H. Surg. Gynec. Obs., 1925, v. 41, p. 565.
Key, B. W. Arch. of Ophth., 1918, v. 47, p. 210.
King, G. L., Jr. Amer. Jour. Ophth., 1931, v. 14, p. 786.
Kolodny, A. Amer. Jour. Ophth., 1931, v. 15, p. 327.
König, F. Arch. f. Orthop. u. Chir., 1929, v. 27, p. 1.
Kraupa. Klin. Monatsbl. f. Augenh., 1911, v. 49, p. 191.
Krauss, F. Ophthalmology, 1916, v. 13, p. 215; New York Med. Jour., 1916, v. 103, p. 877.
Kruskal, I. D. Amer. Jour. Ophth., 1925, v. 8, p. 141.
Kunz. Ztschr. f. Augenh., 1922, v. 47, p. 166.
Ladygin, M. J. Zentralbl. f. Chir., 1924, v. 51, p. 1556.
Lane, F. Ann. Ophth., 1911, v. 20, p. 226.
Lazarescu, D., and Varticlerne. Brit. Jour. Ophth., 193[illegible], v. 14, p. 162.
Lenormant, C. Bull. et. Mém. Soc. Chir., 1920, v. 46, p. 1052.
Lewis, A. C. Jour. Tennessee Med. Assoc., 1931, v. 24, p. 9.
Lewis, P. M. Amer. Jour. Ophth., 1926, v. 9, p. 908.
Lewkojewa. Zentralbl. f. d. ges. Ophth., 1924-25, v. 14, p. 458.
Locke. Ann. Surg., 1924, v. 80, p. 1.
Löhlein. Klin. Monatsbl. f. Augenh., 1928, v. 81, p. 390.
Loos, F., and Irsigler, F. J. Deutsche Ztschr. f. Chir., 1932, v. 236, p. 318.
Lystad, H. Klin. Monatsbl. f. Augenh., 1912, v. 50, p. 88.
Magee, R. S. Amer. Jour. Ophth., 1919, v. 2, p. 744.
Maher, W. O. Ophthalmology, 1913-14, v. 10, p. 407.
Maiocchi. Arch. Ital. di Chir., 1922-23, v. 6, p. 642.
Maness, G. M. Amer. Jour. Ophth., 1928, v. 11, p. 732.
Margarucci, and Giannelli. Riforma Med., 1919, v. 35, p. 919.
Marquez, M. Klin. Monatsbl. f. Augenh., 1924, v. 73, p. 588.
Matas, R. Endo-aneurysmorrhaphy. Ann. Surg., 1920, v. 71, p. 403.
Mathewson, G. H. Ophth. Rec., 1913, v. 22, pp. 294 and 543.
May, G. A. Jour. Iowa Med. Assoc., 1921, v. 11, p. 346.
May. Klin. Monatsbl. f. Augenh., 1932, v. 88, p. 184.
Mayou, M. S. Trans. Ophth. Soc. U. Kingdom, 1917, v. 37, p. 186.
McClelland, W. E. Jour. Amer. Med. Assoc., 1911, v. 74, p. 1552.
Menacho, M. Arch. de. Oftal., 1920, v. 20, p. 20.
Menestrina. Rev. Oto-Neuro-Oftal., 1927, v. 4, p. 285.
Moore, R. F. Brit. Jour. Ophth., 1931, v. 15, p. 272.
Morax, M., and Ducamp. Ann. d'Ocul., 1916, v. 153, p. 252.
Moreton. St. Bartholomew's Hosp. Rep., 1913, v. 49, p. 73.
Nakashima, M. Klin. Monatsbl. f. Augenh., 1924, v. 73, p. 552.
Natason, A. Ztschr. f. Augenh., 1909, v. 22, p. 81.
———. Ztschr. f. Augenh., 1910, v. 23, p. 174.
Nattrass, F. J. Edinburgh Med. Jour., 1928, v. 35, p. 30.
Neff. Jour. Amer. Med. Assoc., 1911, v. 57, p. 700.
Newman. Jour. Tennessee Med. Assoc., 1925, v. 18, p. 229.
Orloff, K. H. Ann. d'Ocul., 1911, v. 146, p. 40.
Ourgaud. Marseille Méd., 1919, v. 56, p. 607.
Palen, G. J. Jour. Ophth., Oto., & Laryng., 1911, v. 17, p. 197.
Pascale, G. Ann. Ital. di Chir., 1922, v. 1, p. 144, 2 cases.
Pemberton, J. Arch. Surg., 1928, v. 16, p. 469.
Petit-Dutaillis. Presse Méd., 1928, v. 36, p. 648.
Pollet, and De Cherf. Bull. et Mém. Soc. de Chir. de Paris, 1920, v. 46, p. 1012; 1923, v. 29, p. 289.
Pooley, T. R. Arch. of Ophth., 1908, v. 37, p. 449.
Posey, W. C. Pennsylvania Med. Jour., 1920, v. 23, p. 658. Ann. Ophth., 1915, v. 24, p. 203.
Raffo, J. M., and Adrogue, E. Rev. de la Soc. Argent. de Oftal., 1925, v. 1, p. 83.
Raverdino, E. Rev. Oto-Neuro-Oftal., 1928, v. 5, p. 155.
Reclus, P. Gaz. d. Hop., 1908, v. 81, p. 1011.
Rhoades, G. B. Ann. Surg., 1916, v. 63, p. 389.
Riehm, H. Deutsche med. Wchenschr., 1922, v. 48, p. 287.
Riese, H. Deutsche med. Wchenschr., 1921, v. 47, pp. 1090, 1109.
Ring, G. O. Amer. Jour. Ophth., 1922, v. 5, p. 554.
Risley, S. D. Ann. Ophth., 1912, v. 21, p. 375.

Rochon-Valière. Amer. Jour. Ophth., 1924, v. 7, p. 152.
Ruata, V. Klin. Monatsbl. f. Augenh., 1930, v. 84, p. 869.
Rubel, E. Klin. Monatsbl. f. Augenh., 1913, v. 16, p. 62.
Rottin. Arch. de Oftal., 1920, v. 20, p. 333.
Ryan, E. Intercolon. Med. Jour., 1909, v. 14, p. 16.
Salus, R. Klin. Monatsbl. f. Augenh., 1918, v. 60, p. 253.
Santa Cecilia. Brasil-med., 1923, v. 1, pp. 4, 161.
Savariaud. Bull. et Mém. de la Soc. de Chir. de Paris, 1912, v. 38, p. 672.
Schaeffer, R. J. Deutsche med. Wchnschr., 1910, v. 36, p. 124.
Schlindwein, G. W. Amer. Jour. Ophth., 1926, v. 9, p. 663.
Schneider, A. S. New York State Jour. Med., 1930, v. 30, p. 569.
Schob. Berlin klin. Wchnschr., 1920, v. 57, p. 1000.
Schwartzkoff, G. Trans. Coll. Phys. Phila., 1929, v. 51, p. 265.
Scotti, P. Amer. Jour. Ophth., 1929, v. 12, p. 938.
Seligstein, M. B. Amer. Jour. Ophth., 1926, v. 9, p. 770.
Seyfarth, C. München. med. Wchnschr., 1920, v. 67, p. 1092.
Shand, J. Jour. Roy. Naval Med. Ser., 1917, v. 3, p. 226.
Shannon, C. E. G. Trans. Coll. Phys. Phila., 1924, v. 46, p. 355.
Shaw, J. J. M. Lancet, 1917, v. 1, p. 879.
Shumway, E. A. Trans. Coll. Phys. Phila., 1923, v. 45, p. 354.
Silvan, C. Rev. Veneta di Sc. Med. Venezio, 1914, v. 61, p. 51.
Snowball, T. Trans. Ophth. Soc. U. Kingdom, 1914-15, v. 35, p. 169.
Spencer, W. G. Proc. Roy. Soc. Med., 1919, v. 13, p. 73.
Stoewer. Ztschr. f. Augenh., 1925, v. 55, p. 344.
Stulz. Rev. d'Oto-Neuro-Ocul., 1924, pt. 2, p. 401.
Suker, G. F. Amer. Jour. Ophth., 1922, v. 5, p. 658.
Sweet, W. M. Amer. Jour. Ophth., 1926, v. 9, p. 440.
Swift, G. W. Amer. Jour. Ophth., 1921, v. 4, p. 124.
Sym, W. G., and Miles, A. Edinburgh Med. Jour., 1914, v. 13, p. 401.
Terrien, F. Rev. Oto-Neuro-Oftal., 1929, v. 27, p. 1.
Tewfik, M. Bull. Ophth. Soc. Egypt, 1921-22, v. 62.
Thompson, H. M., and Thompson, J. W. Amer. Jour. Ophth., 1920, v. 3, p. 605.
Thompson, J. W. Amer. Jour. Ophth., 1932, v. 15, p. 51.
Tindall, P. A. Hahneman Month., 1915, v. 50, p. 671.
Trotter, Sir Wilfred. Commenting on Birley, Brain, 1928, v. 51, p. 184.
Tyson, H. H. Arch. of Ophth., 1930, v. 3, p. 656.
———. Arch. of Ophth., 1919, v. 48, p. 522.
Uffreduzzi, O. Gior. d. r. Accad. di med. di Torino, 1921, v. 84, p. 12.
Vail, D. T., and Oliver, J. C. Lancet Clin., 1914, v. 112, p. 644.
Van der Hoeve, J. Zentralbl. f. d. ges. Ophth., 1926-27, v. 17, p. 656
Verkerk, P. C. Nederl. Tijdschr. v. Geneesk., 1928, v. 72, p. 6120.
Villoria, L. L. Arch. d'Opht., 1929, v. 46, p. 157.
Von Hippel. München. med. Wchnschr., 1924, v. 71, p. 186.
Weaver, J. C. Internat. Clin., 1931, v. 1, p. 104.
Weekers, and Gilson. Bull. de la Soc. Belge d'Opht., 1927, v. 54, p. 37.
Weil, G. Klin. Monatsbl. f. Augenh., 1914, v. 52, p. 119.
Weinkauff, K. Arch. f. Ophth., 1910, v. 74, p. 352.
Wheeler, J. M. Atlantic Med. Jour., 1928, v. 31, p. 812.
Whittham, L. B. Amer. Jour. Ophth., 1923, v. 6, p. 81.
Wilder, W. H. Trans. Amer. Ophth. Soc., 1909, v. 12, p. 832.
Williams, G. Proc. Roy. Soc. Med., Clinical Section, 1909-10, v. 3, p. 171.
Wolff. Amer. Jour. Ophth., 1932, v. 15, p. 1066.
Zeeman, W. P. C. Amer. Jour. Ophth., 1919, v. 2, p. 144.
Zeller, O. Deutsche Ztschr. f. Chir., 1911, v. 111, pp. 1-39.
Zentmayer. Jour. Amer. Med. Assoc., 1916, v. 67, p. 163.
———. Trans. Coll. Phys. Phila., 1924, v. 46, p. 353.
Zerfoss, K. S. Amer. Jour. Ophth., 1932, v. 15, p. 1066.

Discussion. Dr. T. L. Terry: Do you wait for establishment of collateral circulation, if such does not endanger the eye, before ligating the carotid?

Dr. Dorrance: No sir. We have found that you will not have corneal complications if you ligate early. We find that the sooner you can ligate the common carotid artery the better. In operating upon the carotid artery, it is essential that as little trauma as possible be given to the carotid bulb. It is preferable to operate under local anesthesia. In the event of operation under general anesthesia, local anesthesia should be given to the area around the carotid bulb.

EXPERIMENTAL DETACHMENT OF THE RETINA

Permanent retinal detachments produced in rabbits' eyes

RAMON CASTROVIEJO, M.D.
NEW YORK CITY

The procedure herein described induces vitreous changes, rents in the retina, and subretinal fluid, all of which are present in most cases of human retinal detachment.

The rabbit is anesthetized with subcutaneous injection of pernocton, an injection of cocaine, 2 percent, and epinephrine in the upper bulbar conjunctiva. An incision is made along the equator in the conjunctiva, and the muscles are severed to expose the sclera. Slightly behind the equator, a scleral suture is inserted for closing an incision 3 mm. long, made with a Graefe knife, which severs sclera, choroid, and retina, penetrating into the vitreous. A small syringe with fine, dull-pointed needle is used to withdraw about ½ c.c. of vitreous through this incision. The eye becomes soft and separation of retina from choroid is easily accomplished with the help of a spatula, after which the vitreous is reinjected between the detached retina and choroid. Rapid tying of the scleral suture prevents drainage of intraocular fluid; the conjunctiva is sutured, and atropin and metaphen ointment are applied, a dressing being unnecessary. The detachment can be seen immediately after the operation. No tendency to reattachment has been observed after four months. From the Institution of Ophthalmology, Columbia Presbyterian Medical Center. Read before the Association for Research in Ophthalmology, in Cleveland, June 12, 1934.

The first step in arriving at the solution of the cure of retinal detachment is to produce detachments in animal eyes, and thus obtain material from which different experiments can be worked out. Many methods have been described for causing such detachments in animals. A brief description of the fundamental procedures used will summarize the present status of this experimental problem.

Chodin, in 1875, showed that retinal detachments were often produced in rabbits' eyes when a sufficient amount of vitreous was lost through scleral incisions. Rahlmann, in 1876, produced retinal detachments by the injection of concentrated salt solution into the vitreous. Boucheron, in 1883, and Simi, in 1884, injected a dilute solution of cantharidis between the sclera and choroid. Leber, in 1886, repeated the experiments of Rahlmann, and was able to produce detachments by introducing particles of different metals into the vitreous. Bach, in 1895, while studying in rabbits' eyes the changes produced in the ganglion cells of the retina under the influence of different irritants, obtained retinal detachments by injecting sublimate and sodium chloride into the vitreous. In 1904, Wessely used the steam cautery applied for several seconds to the sclera of rabbits, obtaining retinal detachments. Best, in 1906, experimenting on diabetes, injected phloridzin under the conjunctiva of rabbits' eyes, which resulted in the formation of an exudate between the choroid and the retina. In 1909, Schreiber and Wengler introduced electrolytic iron into the anterior chamber, for the purpose of producing experimental glaucoma, but instead, the result was a retinal detachment. In the same year, Birch-Hirschfeld and Inouye produced detachment in animals' eyes by withdrawing from ½ to 1½ c.c. of vitreous through a cannula, 1.5 mm. in diameter. These authors observed that in some of the detachments thus obtained retinal rents were produced. The detachments without rents had a marked tendency to heal spontaneously, but in those with tears the retina became reattached with more difficulty. Castresana, in 1912, made scleral incisions in rabbits' eyes and detached the retina with a spatula. The retinal detachments produced in this way were cured a few days afterwards with subconjunctival injections of a one-percent solution of zinc chloride. In 1925, Weekers was able to obtain retinal detachments in rabbits' eyes by a method similar to that of Wessely, but used a galvanocautery instead of the steam cautery. Weekers, in 1929, also produced retinal detachments by injecting into the episclera one-fourth cubic centimeter of tincture of iodine. Hagedoorn, in 1930, obtained detachments in rabbits' eyes

by making a trephine opening in the sclera through which a cannula was introduced into the eye, and applied against the retina under the control of the ophthalmoscope. By withdrawing the cannula at the same time that suction was made, a retinal rent without hemorrhage was obtained. In 1931, Mayer repeated the experiments of Castresana, obtaining detachments with or without rents in the retina; but spontaneous reattachment occurred, regardless of the hole in the retina, after a period of six weeks. Mayer was then able to produce detachments in rabbits' eyes by the injection into the vitreous of a dilute solution of trypsin. These detachments lasted for over five months but finally reattachments took place. Lobeck, in 1932, using the technic of Birch-Hirschfeld and Inouye, observed that when suction was made with the tip of the cannula in the center of the eye, it was difficult to produce rents; but when that suction was made while withdrawing the cannula, the traction upon the retina produced a tear. In 1932, Tillé successfully repeated the experiments of Weeker, obtaining detachments in rabbits' eyes by the application against the sclera of the galvanocautery. Ophthalmoscopic and histologic study of the eyes treated in this manner showed changes varying from simple edema to the production of rents in the retina. In the discussion of Tillé's paper, Dollfus and Terrien stated that the same changes produced by application of the galvanocautery could also be obtained by diathermocoagulation. Veil observed the same lesions in rabbits' eyes by applying the cryocautery against the sclera for several seconds.

In 1933, Dejean successfully repeated the experiments of Birch-Hirschfeld. The vitreous was removed from the eye without the exertion of traction, to prove that hypotony was sufficient to produce the detachment. No statement was made by the author about the duration of the detachment. Consistent results were obtained by Arruga, in 1933, in rabbits' eyes, using the following method: Sclerotomies of about 3 mm. were made, followed by the introduction of a blunt cannula applied against the retina and withdrawn slowly while, at the same time, suction was made. This procedure, by withdrawing from half to two thirds of the vitreous, resulted in the production of hypotony, retinal rent, and detachment. This techni was used in seventy-two eyes. In fifty-two, retinal rents were produced and, of these, thirty developed retinal detachment. It is inferred in reading Arruga's work that the detachments were not followed for a period of more than three months. Arruga stated that detachments produced in rabbits have a marked tendency to spontaneous reattachment, which he attributed to the fact that the movements of the rabbits' eyes are very limited. Detachments in rabbits' eye, with and without rents in the retina, were also obtained by Arruga using different procedures previously described by other authors, but the results were inconsistent.

From the outline presented above, the different technics used for the experimental production of retinal detachments can be classified into three fundamental groups:

(1) In the first group, detachment is obtained by external traumatism (blow, steam or galvanocautery, diathermocoagulation, etc.). Microscopic study of eyes affected by different sorts of trauma reveals that it is not the nature of the traumatism, but the intensity of it, that produces the various pathological changes. Different sorts of traumatism, such as blows, burns, etc., may produce the same changes if they are applied with corresponding intensities. When the traumatism is not very severe, the only pathology present in the eye is vascular congestion of the choroid and slight edema of the external layers of the retina. If the traumatism is more intense, there will be some destruction of the choroid and of the external layers of the retina, and the production of a seroalbuminous exudate between the choroid and the retina. More severe traumatism will cause marked destruction of sclera, choroid, and retina, production of retinal rents, abundant seroalbuminous exudate between the choroid and retina, hemorrhages, and vitreous changes. The outcome of the

detachments produced by external traumatism varies according to the intensity of the trauma. If the trauma is mild the exudate is soon reabsorbed and a spontaneous reattachment invariably takes place. When the traumatism is of enough intensity to produce retinal rent, spontaneous reattachment takes place in a high percentage of cases, in spite of the retinal rent, as soon as the exudate has been reabsorbed. Exceptionally, permanent detachments can be obtained after severe traumatism, when vitreous bands are formed that pull the retina inward. This is likely to happen subsequent to the organization of hemorrhages, but the detachment thus obtained can hardly be compared to the so-called human idiopathic detachment.

(2) In the second group, detachment is obtained by the introduction of chemical substances into the eye. The mechanism of production of this detachment is not well known, and the reports published about it are not sufficient to allow definite conclusions to be drawn. However, the detachments do not seem to be permanent unless the chemical substance causes considerable change in the intraocular contents. This type of detachment is, therefore, similar to the secondary detachment of the retina that occurs in human eyes with intraocular foreign bodies, but in no way approaches the human idiopathic variety.

(3) In the third group, detachments are obtained by the withdrawal of vitreous, mechanical separation of the retina from the choroid with the aid of a spatula, or both. By using these procedures an immediate detachment with or without rent in the retina is likely to occur in many of the cases in which vitreous has been withdrawn, and in all the cases in which the spatula has been used. This type of detachment, whether produced by the simple withdrawal of vitreous, or by the aid of the spatula with only slight traumatism to the choroid, has a marked tendency to spontaneous reattachment in spite of the rent in the retina, because the subretinal seroalbuminous fluid is easily absorbed by the unaffected choroid of normal animals. However, some permanent detachments may be obtained when vitreous bands are formed having the same nature as the ones mentioned in the second group.

In conclusion, it may be stated that up to the present time permanent experimental detachments of the retina, similar in all characteristics to the human idiopathic detachments, have not been produced. The reports found in the literature indicate that some of the detachments obtained were temporary, while in others the results were very doubtful.

In the human idiopathic detachment there are to be found, as main characteristics, vitreous changes, subretinal fluid, retinal rents in a large number of cases, and very little tendency to spontaneous reattachment. Gonin, Lindner, and Arruga, in their first statistics, showed retinal tears in only sixty percent of the detachments. In their last reports the same authors had been able to find rents in the retina in ninety percent of the cases.

Gonin, Lindner, Vogt, and Arruga insisted upon the necessity of a hole in the retina for the production of the detachment and emphasized the necessity of closing this hole to obtain reattachment.

Arruga found that the subretinal fluid, obtained from eyes with detached retinas, contained little albumin, and was always transparent and viscid, having all the clinical characteristics of normal vitreous, if the fluid was obtained within five days of the date of detachment. After five days, the fluid becomes slightly yellowish, remaining thus for two or three more weeks. After three weeks, the fluid obtained is yellowish in most of the cases, reddish in some, and frankly hemorrhagic in exceptional cases. Arruga found an increase in the quantity of albumin in the subretinal fluid, in proportion to the time that had elapsed. Sometimes in old cases the albumin is again absent, perhaps owing to atrophy of the choroid. Arruga is of the opinion that the subretinal fluid is vitreous that remains normal or almost normal during the first few days after the onset of the detachment and afterwards becomes altered, due to choroidal reaction.

Basing experiments on the above-

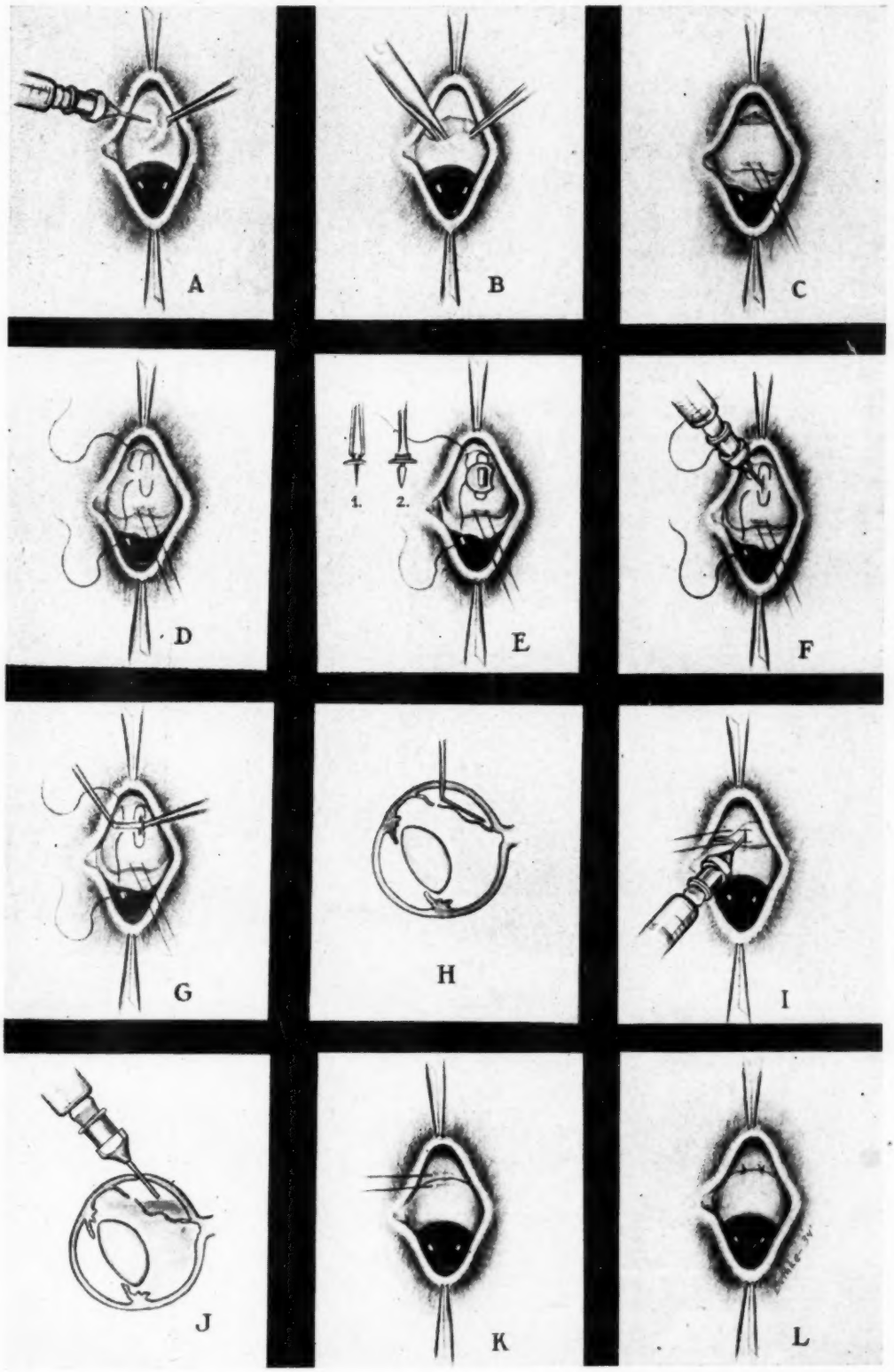


Fig. 1 (Castroviejo). Successive steps in the author's technic for inducing retinal detachment in rabbits' eyes.

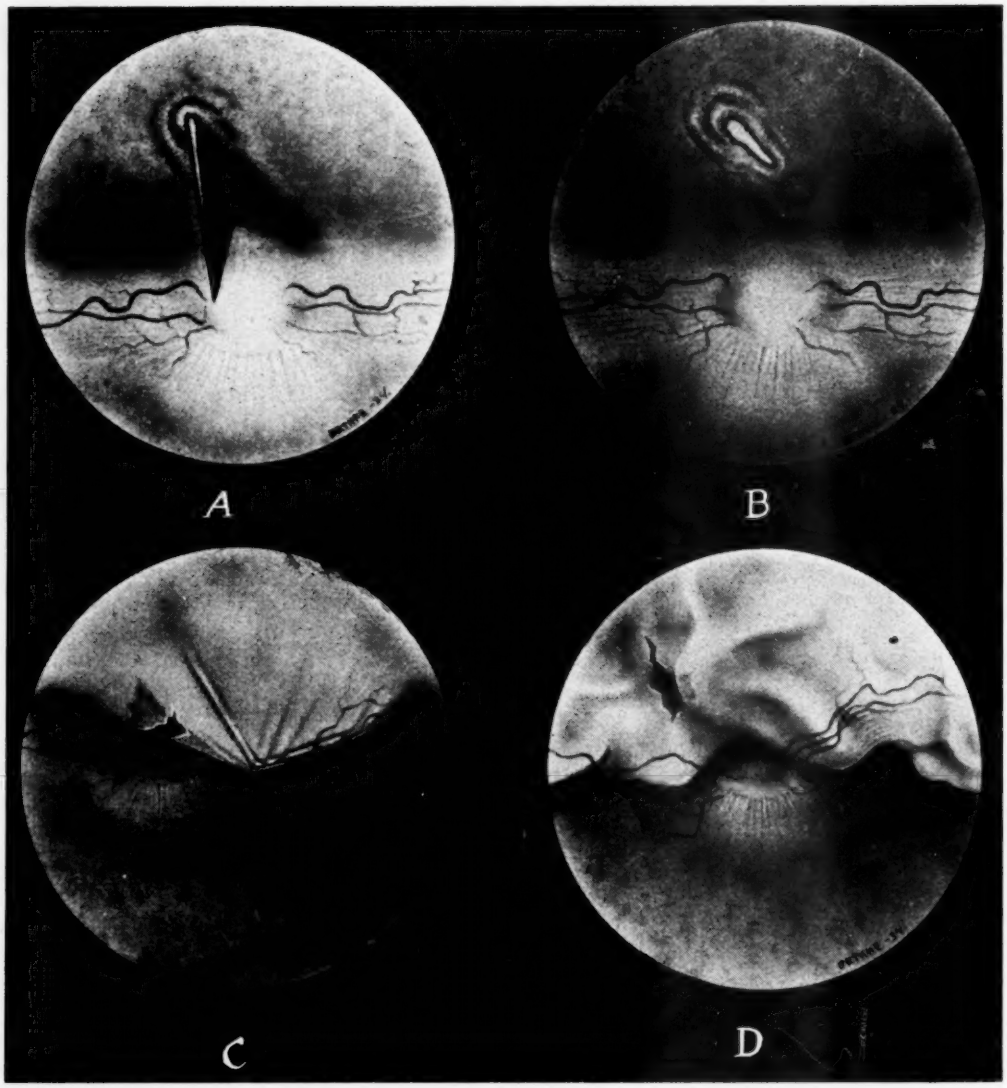


Fig. 2 (Castroviejo). Ophthalmoscopic aspect of the fundus of rabbits' eyes during the successive steps of the operation. A, Arruga's needle piercing the sclera, choroid, and retina, penetrating into the vitreous. B, fundus after the withdrawal of Arruga's needle and vitreous. C, view of retina being detached with the spatula. D, detachment of the retina with rent, immediately after the operation.

mentioned facts, a technic has been developed with a view to producing in rabbits' eyes retinal detachments having most of the characteristics of the human idiopathic detachments; namely, vitreous changes, retinal rents, subretinal fluid, and little tendency to heal spontaneously. Gray rabbits were selected for the experiments instead of albinos, so that any pigmentary changes that might take place in the fundus could be observed.

The technic may be described as follows: General anesthesia is obtained by a subcutaneous injection of pernocton (sodium sec. butyl-bromallyl barbiturate in a ten-percent solution). The pupil is dilated with instillations of a three-percent solution of atropin sulphate. The eyelids are painted with a

3½-percent solution of iodine. Argyrol, twenty-five percent, and adrenalin, 1/1000, solution are instilled into the eye, and an injection of two-percent of cocaine and adrenalin, 1/10,000 is made (fig. 1, A) in the upper bulbar conjunctiva. Along the equator of the eye an incision is made in the conjunctiva and the rectus muscle severed to expose the sclera (fig. 1, B). A suture is placed in the tendinous stump of the muscle in order to direct the eye as required (fig. 1, C). A double-armed suture is then placed in the sclera a few millimeters beyond the equator of the eye, and passed through the margins of the conjunctiva in the upper and lower flaps (fig. 1, D). This suture will be used to close the incision that will be made subsequently in the sclera. Arruga's orientation needle (fig. 1, E; 1 and 2) is placed between the loops of the suture and an incision of about 2 mm. in length made, perforating sclera, choroid, and retina, and penetrating into the vitreous cavity. This incision can also be made with an ordinary cataract knife. Arruga's needle is then removed and a blunt hypodermic needle about 1.5 mm. in diameter is inserted into the opening (fig. 1, F), directed backwards in order to avoid injury to the lens. From one-half to two-thirds cubic centimeter of vitreous is removed by suction and the retina separated from the choroid with the aid of a spatula, as indicated in figure 1, G and H. The vitreous is then reinjected between the retina and the choroid (fig. 1, I and J). While this is being done, the scleral suture is held taut to keep the reinjected vitreous within the eye, after which the suture is securely tied (fig. 1, K). During these intraocular manipulations care must be taken to avoid injury to the lens, which, in rabbits, occupies a great part of the intraocular contents. An extra suture is placed to close the conjunctival incision (fig. 1, L) and metaphen ointment applied. A dressing is not necessary. The different steps in the operation can be easily followed with the aid of an ophthalmoscope, as illustrated in figure 2, A, B, C, and D.

A detachment that has all the objective clinical characteristics of the human idiopathic detachment is obtained in every case. This detachment can be observed immediately after the operation. Four months have passed since the date of the first experiment and the detachments have not shown any tendency toward spontaneous cure.

In the future a report will be given with further clinical and histological data.

Conclusion

The method here presented has produced apparently permanent retinal detachments in rabbits' eyes. Heretofore, retinal detachments have been obtained by making retinal rents and withdrawing vitreous, but, since the subretinal fluid was absorbable, the detachments proved to be only temporary. It may, therefore, be assumed that the success obtained by using the method here presented is due to the presence, between the choroid and retina, of a substance, such as vitreous, that is not easily absorbed.

References

Anderson, J. R. Detachment of the retina. University press, Cambridge, England, 1931.

Arruga, H. Etiologia y patogenia del desprendimiento de la retina. Trans. XIV. International Cong. of Ophth., Comm. of Publications of the Cong., Madrid, 1933, v. 2, pt. 1, pp. 5-191.

Dejean, C. Résultats expérimentaux de tentatives de décollements rétiniens. Trans. XIV. International Cong. of Ophth., Comm. of Publications of the Cong., Madrid, 1933, v. 2, pt. 2, pp. 118-123.

Mayer, L. L. An experimental study of detachment of the retina and its surgical therapy. Trans. Amer. Acad. Ophth. and Otolaryng., 1931, pp. 89-104.

Tillé, H. Experimental detachment of the retina. Ophthalmoscopic and anatomic study. Bull. Soc. d'Opht. de Paris, 1932, Dec., pp. 648-53.

LENS EXTRACTION IN MYOPIA

PROF. DR. ANTON ELSCHNIG
MARIENBAD, CZECHO-SLOVAKIA

The writer reports on 110 such operations, and recommends the procedure in suitable cases because of the accrued benefits to the recipient. The degree of myopia, visual acuity with glasses, and corneal radius are factors determining suitability for operation. In younger patients, operation is contraindicated if the myopia has been stationary at less than 18 diopters for some years; but when progressive, it may be performed when the myopia is as low as 14 diopters. Contraindications are present also when the patient can satisfactorily wear correcting glasses, and when detachment of the retina has affected the fellow eye or may be in the family. The technic is given in detail. Read before the Chicago Ophthalmic Society, February 26, 1934.

The desire to cure high myopia by operation has existed for more than a century. It has been recognized as far back as in 1753, that extraction of the lens would alter the refraction, at which date Richter pointed out that the ideal treatment of high myopia would be the extraction of the crystalline lens. Previous to that Higgs, in 1745, had endeavored to follow this procedure, and some years later the German oculist von Haller, in 1763, as well as Samuel Sharp, tried the identical operative procedure. But, apart from these men, nobody had the courage to perform the operation. Five decades later Fukala of Pilsen reopened the question by reporting the discission of the lens in high myopia. Immediately the whole ophthalmological world became enthusiastic about this procedure. But the enthusiasm was short-lived. Some operators reported detachment of the retina in 10 percent of cases, others reported secondary glaucoma in as high as 30 percent, while others admitted 2 percent infection. These disappointments resulted in abandonment of the operation to such an extent that Hirschberg refused the description of the procedure for his History of Ophthalmology. There were two causes for the disappointment; first, the indications for operation; second, the type of operation.

Indications for operation. Fifty years ago, every oculist reasoned as follows: An emmetropic eye, after extraction of the lens, requires + 12 diopters to restore emmetropia, and consequently a myopic eye of —11 diopters should become emmetropic after extraction. Schnabel recognized that this was not so. When a myopic eye of 10 diopters upward is operated upon, the aphakic eye is found to be highly hypermetropic. It is true that the correcting glass in a former emmetropic eye after extraction is generally +11 diopters, but this is not identical with the hypermetropia of +11 diopters. The focus of +11 diopters and, consequently, the far point of the eye is 9 cm. behind the optic center of the lens; therefore only 7 cm. behind the optic center of the eye. Hence, the correcting glass of +11 diopters means hypermetropia of about 14 diopters. On the other hand, a myopic eye which is to become emmetropic after extraction must be at least —20 diopters; consequently has a far point in the focus 5 cm. anterior to the optic center of the lens; and therefore the far point is at the same distance (about 7 cm.) anterior to the optic center of the eye. Thus the calculated myopia is only about 14 diopters; thus the myopic eye corrected with a —10-diopter glass has a calculated myopia of 8.5 diopters, and after extraction of the lens would be hypermetropic about 6 diopters. This would have to be corrected by +5.5 diopters, and for reading by +9 diopters.

The second cause of disappointment lay in the consequences of the **type of operation.** The discission was performed and repeated several times if the lens was not quickly absorbed. But the anterior chamber was emptied only if the lens became glaucomatous. But why should the results in the extraction of myopic lenses be so far below the results of juvenile cataracts, when the technic is essentially the same? Probably because the myopic eye is not a normal one and every irritation causes

more trouble than would occur in a nonmyopic eye.

As a result of the poorer resistance of these eyes, there is a tendency toward iridocyclitis, toward detachment of the retina, and toward secondary glaucoma. I have seen many patients operated upon elsewhere, who became totally blind after the operation.

Technic

More than twenty-five years ago I began to attempt the extraction of the lens for myopia, and during the past few years I have become more and more enamored of this procedure. My first principle is that only one eye is to be operated upon at a time and the second one not until the first eye has been perfectly quiet for at least a full half year. The reason for this delay is the possibility of detachment of the retina which may occur in any myopic eye. Later we shall revert to this serious complication.

The technical procedure varies according to the age of the patient. Ten years is the earliest age at which the patient should be operated upon, and then only if the child is very obedient and intelligent; otherwise not until the 14th year has been reached. Between that age and 25 years, I perform a discission in the lower half of the pupillary area of the lens, the pupil being well dilated with atropine. It stands to reason that the eye must be quiet and the conjunctival sac sterile. The upper portion of the pupillary area of the lens should remain intact, so that in case the lens swells greatly the upper half of the anterior chamber will remain deep enough to permit a keratome incision. Following discission, atropine and ice are used in order to prevent a rapid swelling of the lens. Subsequent to the discission there appears first a posterior cortical cataract. On the third or fourth day, when the lens has begun to swell, a keratome incision is made at the upper limbus, the remaining lens capsule is lacerated with a pointed hook, and the lens evacuated by suction. Eserine is then instilled. The aftertreatment and complications are handled like those subsequent to extraction of any soft cataract. By early extraction of the lens, we avoid irritation of the iris and a possible secondary glaucoma. When the capsule is well opened, as it should be, the remains of the lens are generally absorbed in about two weeks. If this does not proceed as rapidly as we deem advisable, it is well to open the chamber again and extract as much of the lens material as possible. The second operation is certainly less irritating to the eye than the cortical lens remaining in it. The second incision of the keratome is to be performed in the meridian of the cornea having the greatest refractive power, thereby diminishing the astigmatism that is preexistent or due to the first incision; but here, as well as in the first instance, great care must be exercised to avoid any possible prolapse of the vitreous, particularly because such prolapse results in an eccentricity of the pupil and subsequently necessary iridectomy.

We have performed, in all, 110 such operations for myopia, and even in the hands of younger assistants vitreous prolapse occurred in less than 5 percent. We have never had a serious iridocyclitis, never an intraocular infection, and never a secondary glaucoma. The greatest danger lies in detachment of the retina, and this danger is enhanced by prolapse of the vitreous. If the operation has been entirely without complications and the healing uneventful, I do not believe that any detachment which may occur postoperatively can be attributed to the surgical intervention, if an interval of more than three or four months has elapsed between the operation and the detachment.

In my series, detachment occurred in only two cases, one of which was healed by operation and the other not. In this connection, let me cite two interesting cases. The first occurred in Vienna on my service in the Schnabel Clinic, many years ago. An attractive young woman from Cologne came to be operated on for myopia, and, during the period of preparation before operation, developed detachment of the retina in both eyes. The second case occurred eight years ago. We had performed a discission in a young girl for high myopia. Three days

later, just previous to the extraction, I found the eye very soft. Examination revealed detachment of the retina. This is the only eye that I have lost in this manner. But there occurs in practically every young eye, after an extracapsular extraction of any character, a secondary cataract in the form of a droplets cataract, which requires discission two to five years later.

In the rare cases when a patient more than 25 years old wishes to be operated on for high myopia, our procedure is very different. Here I prefer the immediate intracapsular extraction, with a few changes from the routine technic. The incision must be very large—at least two fifths of the circumference of the limbus—or, if the cornea is very small, a full one half. A Liégard suture is inserted through the cornea and the conjunctival wound prior to the incision, and the routine incision of the root of the iris is performed. If the capsule cannot be grasped with blunt forceps, as sometimes occurs, it will be necessary to open the capsule with sharp forceps, and if the section is as large as it should be, it will generally be possible to evacuate the lens almost totally by pressure on the lower margin of the cornea and on the sclera above the incision.

Thus far, I have had the opportunity of extracting the lens for high myopia in patients over 23 years of age only twelve times. In nine cases it was possible to extract the lens within the capsule, the youngest patient being 23 years old. In three cases it was not possible to grasp the capsule, or the capsule burst after the forceps had been applied. In every one of the twelve cases recovery was uneventful. It seemed that the older the patient, the better were the chances of a successful intracapsular extraction.

Refraction

As it is necessary to measure the refraction as accurately as possible, we always take the average of three different examinations. We measure first the refraction at the lateral margin of the disc or crescent with the Morton ophthalmoscope, the mirror being not more than ½ to ¾ cm. anterior to the cornea of the patient (thus putting the correcting glass in the mirror not more than 2 cm. from the cornea); then we measure the far point with the finest type of the Hegner test that the patient can read; and last, we measure with skiascopy. It is also important to measure the radius of curvature of the cornea. Most frequently there is an astigmatism of the cornea against the rule, so that the vertical meridian has the weaker refracting power. After extraction, the cornea is, of course, the only dioptric apparatus of the eye, and the refraction depends upon the radius of the cornea and the length of the axis of the eye. The latter we cannot measure.

In this connection, it may be of interest to note that in 44 eyes the refraction of which I had tested *ante mortem*, I found the following axial lengths after death: In myopia of from 2 to 6 diopters, the length was from 25.0 to 26.5 mm. This increased steadily until a myopia of 30 diopters showed an actual length of 33 mm. The longest eye was one of 30 diopters, which measured 35 mm.

As we know, the position of the crystalline lens is also of great importance in the refraction. The flatter the anterior chamber, the greater the refracting power of the lens. From the tables, you can see that most frequently an eye with a radius of 7.5 mm. and a myopia of 20 diopters (that is, a calculated 14 diopters), becomes emmetropic after extraction.

During the earlier periods of myopia extraction, the oculists were surprised to find how much the vision improved after extraction, when measured by the Snellen test type. That phenomenon is, of course, quite natural. During the testing of vision with Snellen type and concave glasses, the retinal picture is much smaller than in an emmetropic eye, and therefore vision is less than would be supposed. Consequently, when the lens is removed, the eye becomes emmetropic or even slightly hypermetropic. Vision is increased so that we can always promise the patient an improvement in vision if there is no central scotoma, or lesion in the back of the eye. Of course, for reading, these

patients always require an additional correction, like any other aphakic eye.

It might easily be supposed that after extraction for myopia there would be an increased danger of the development of severe macular affections of the retina, but this, in my experience, has not been true. The myopia has increased somewhat in cases where it had been progressive for the last year previous to extraction. It is self-evident that the retina of the aphakic eye that is not protected against ultraviolet rays by the absorbing power of the lens, might develop the same choroidal change as an untreated eye; consequently it is rather important to try to protect such eyes against excessive light, and one of the greatest safeguards is the preservation of the central round pupil.

Summary

I would emphasize that the extraction of the lens in high myopia in suitable cases is one of the most impressive operations, and one that bestows the greatest possible benefits upon such subjects. Many patients upon whom I have operated and who were not accustomed to the use of correcting lenses said that the greatest joy they had had in life was their first excursion into the country after the operation.

The indications for operation depend upon the degree of myopia, the acuity of vision with correcting glasses, and upon the radius of the cornea. As we saw in the foregoing discussion, myopia of 20 diopters with a corneal radius of 7.5 mm. results in an emmetropia after operation. Consequently in younger patients, in whom the condition has been stationary for at least several years, the operation should not be performed if the myopia is less than 18 diopters; but if the myopia is progressive, the operation may be performed when it is as low as 14 diopters, particularly if the radius of the cornea is small.

The operation is contraindicated if the patient is able to wear a correcting glass with sufficient resultant vision; but if the vision is not satisfactory with the proper correcting glass, operation may be indicated. If both eyes are myopic, I advise that the worse be operated upon first. I would not operate on an eye whose fellow has a detachment of the retina, particularly not if the patient comes of a family in which detachment of the retina has been known to occur. I do not believe that the operation, well performed, increases the danger of detachment, but to an unintelligent patient the relationship between the operation and a subsequent detachment appears so intimate that we must not subject ourselves to any such possible criticism.

I have not yet had the opportunity of operating on one highly myopic eye whose fellow eye has been emmetropic, but I do believe such an operation would be indicated, on account of the advantage of the increased field of binocular vision.

Richard Wagnerhaus.

Table

RESULTS OF THE MYOPIA OPERATIONS

(1) With correcting glass of —14 to —24 diopters before operation (calculated myopia of 12 to 18 diopters):

50 percent became emmetropic, with a corneal radius between 6.8 and 7.6 mm.
33 percent remained myopic (less than 3 diopters) with a corneal radius between 6.1 and 7.5 mm.
17 percent became hyperopic (less than 3 diopters) with a corneal radius between 7.6 and 7.8 mm.

(2) With correcting glass of —25 to —44 diopters before operation (calculated myopia of 19 to 25 diopters):

30 percent became emmetropic, with a corneal radius between 7.7 and 8.0 mm.
50 percent remained myopic (less than 5 diopters), with a corneal radius between 7.4 and 7.8 mm.
20 percent became hyperopic (less than 2 diopters), with a corneal radius between 7.8 and 8.2 mm.

DIATHERMY IN RETINAL DETACHMENT

Report of a case with severe nystagmus as a complication

M. HAYWARD POST, M.D.
SAINT LOUIS

Using the Clifford B. Walker diathermy apparatus, a case of detachment of the retina was operated upon four times for successive, variously located detachments. A successful result was ultimately obtained, despite inability to locate tears in the retina, and the presence of violent nystagmus. From the Department of Ophthalmology, Washington University. Read before the Ophthalmic Section of the St. Louis Medical Society, April 13, 1934.

It is probable that no subject has received more attention in the ophthalmic literature of the present day than detachment of the retina. It is also likely that the treatment of no condition confronting the ophthalmologist has made greater strides in the past ten years. Gonin's magnificent contribution, brought definitely to the attention of the ophthalmologists of the world at large at the International Congress in Scheveningen in 1929, started the train of succeeding events. Since that time, numerous modifications of his operation have been advocated. Lindner and Guist suggested a somewhat different procedure, which has also had considerable success. Contemporaneously, there has been occasional use of diathermy in the treatment of detachment. In an extensive article appearing in the January number of the American Journal of Ophthalmology, Dr. Clifford B. Walker reviewed the history of the early work of this latter type, and described an apparatus which he had developed and is now using. [Such an instrument was obtained by the Washington University Department of Ophthalmology and was used for the operation in the case herewith reported.]

Simultaneously, there has waged considerable discussion as to the part played by tears in detachment of the retina, and the necessity for localizing and in some manner sealing up such torn areas. The weight of evidence, judging from cases reported up to the present time, seems to show that tears of the retina and their occlusion do play a large part in the etiology of detachment and in the success of reparative operations. Many cases of detachment have been observed, however, where no lacerations could be demonstrated. Numerous authors have described more or less elaborate localizing apparatus, while a few, some even among these former, have stated that accurate localization is of no particular value. The Gonin operation would seem to depend very largely upon the accurate observation and localization of the lesion, while diathermy, with its barragelike attack, appears to render such accurate localization far less necessary. The case to be reported lends support to this view, and, indeed, seems to point to the possibility that much may be accomplished even in the absence of any tear, at least in some of the detached areas.

B. L. D., a male, aged thirty-five years, first reported at the office on February 27, 1930. The immediate complaint was that about one hour previously the left eye had been struck by a piece of steel. The past history was of especial interest in that marked inflammation and discharge had occurred at the time of birth. The sight had always been poor and the eyes had always oscillated. Substantiating this history, extensive nebulae of the right cornea were present, along with seclusion of the pupil, evidently the result of an old plastic iritis. In the left eye there was a delicate nebula of the lower portion of the cornea and also quite definite anterior and posterior polar capsular cataract. Excessive lateral nystagmus in all the cardinal directions, as well as in direct fixation, was a prominent feature, which markedly complicated all observations. In addition, the left eye turned up and out during fixation with the fellow eye.

Superimposed upon this picture were the lesions resulting from the recent injury. There was noted a perforating wound (extending three millimeters in

the horizontal meridian) through the central portion of the cornea, to which the iris was adherent. Following the use of atropine, this adhesion yielded, the pupil dilated, and a hole appeared through the iris to the temporal side in the horizontal meridian, about one millimeter from the pupillary margin. Corresponding to this laceration was observed a penetrating wound of the lens capsule, with slight clouding in the immediate neighborhood. Because of the nystagmus, no foreign body could be seen, and for the same reason little help could be obtained from the slitlamp and binocular microscope. X-ray plates were taken while the eye was held comparatively steady with forceps, but showed no foreign body. Very fortunately, the local wounds healed without complication and without further cataract formation. The vision was 20/96, and could be improved only very slightly by any glass, though the patient thought that he saw somewhat better with minus 2.00 D. sphere over the left eye. On September 29, 1930, an optical iridectomy was done up and out on the right eye. This appeared quite satisfactory, but owing to cloudiness in the vitreous, the vision has never been better than 2/240.

The history was uneventful from that time until October 14, 1933, when the patient reported that the vision in the left eye had failed rapidly during the past week. That of the right eye was found to be 2/240; that of the left, fingers at five feet, in the upper field only. Detachment of the retina could easily be seen, including the entire upper quadrant, and hanging low enough to obscure the disc. Details, however, were made out with difficulty. The detached retina was best seen with a plus 12.00 D. spherical lens in the ophthalmoscope. The lens changes remained as at the first visit. Diathermy was recommended. Two days later the patient was seen at Barnes Hospital, and reported that the previous afternoon, following a nap, vision had improved remarkably. On this occasion, the retina was observed best in some places with a minus 2.00 D. sphere, and at others with a plus 4.00 D. sphere. Detachment obviously still persisted, though to a less marked degree. No tear could be made out. On October 16, a rough field was made in the hospital, showing a loss corresponding to the detachment seen with the ophthalmoscope.

On October 18, the superior rectus was severed close to its insertion, and the sclera was cleared for a distance of twelve to fourteen millimeters back of the corneal limbus. Ten punctures were made twelve millimeters from the limbus across the upper quadrant, about 3½ mm. apart, using the medium-sized Walker pins. These were reinforced by four punctures three millimeters farther back. The sclera was then opened by a puncture with a Graefe knife and a Holth punch. The muscle was sutured back in place and the conjunctiva closed with a running untied suture. The patient reported very little pain, and only slight reaction was made out. On the 24th, the retina appeared to be in place, though observations were always difficult because of the nystagmus. One percent atropine was used daily. The patient remained in bed, flat on his back. Nevertheless, on the 27th, eleven days after operation, he was complaining of blurring in the upper field, and a dark cloud was seen floating in the vitreous below. A careful field was made at this time, showing considerable loss of the upper portion.

At the second operation, on the 30th, the lower quadrant of the globe was exposed in a manner similar to that used for the upper during the previous procedure. Some trouble was experienced in obtaining the proper current and there was difficulty in forcing the pins through the sclera. A similar incision was made with a Graefe knife at the close of the operation. The punch was not employed. Very little fluid escaped, and the eye did not appear especially soft. Again only slight reaction occurred. The patient was treated in a similar manner, and on the ninth day following no detachment could be made out. The patient felt that the vision was better, and he was discharged from the hospital on November 8. On November 11, the vision was 10/240. The media were somewhat cloudy, but permitted

an indistinct view of the retina. No detachment could be made out. On November 13, the vision had risen to 8/192. The upper field appeared to the patient to be somewhat unsteady, but still no detachment could be observed. He was allowed at this time to go to the country

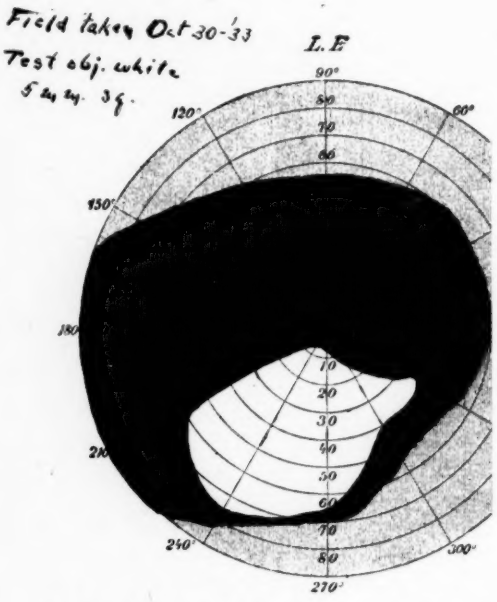


Fig. 1 (Post). Field taken October 30, 1933 with a white 5-mm. square test object.

on a short visit. On November 26, he reported that two days previously a cloud had appeared in the lower temporal field, that he had gone to bed at once for twenty-four hours and then had returned to the city. Examination showed a detachment in the upper nasal quadrant.

On December 4, the sclera was again exposed, well behind the equator and to the nasal side of the superior rectus, which was not resected. Owing to the previous difficulty with the Walker pins, twelve punctures were made, using the Walker apparatus and the Walker diathermy needle. The sclera was excised and the subretinal fluid drained out. The vision was still cloudy, especially throughout the upper quadrant. The field taken at this time showed considerable constriction, especially to the nasal side. It was, however, much improved over that of October 30. It seemed best, nevertheless, to await developments. The patient was much discouraged at this time. He felt that the vision was failing and that ultimately complete detachment would take place. On January 15, with minus 3.00 D. sphere, 18/150 could be read. The field, nevertheless, showed constriction above. There appeared to be some loose folds of retina above and considerable detachment below. Both operator and patient were rather pessimistic with regard to the outcome.

On January 21, the patient consulted Dr. Meyer Wiener, who felt that the condition of the eye warranted further operation. Another attempt was decided upon. At the time of the final operation, marked detachment was seen below and to the temporal side, elevated about ten diopters. None, however, surprisingly enough, could be made out above. It was determined to make the procedure as extensive as possible. The eye

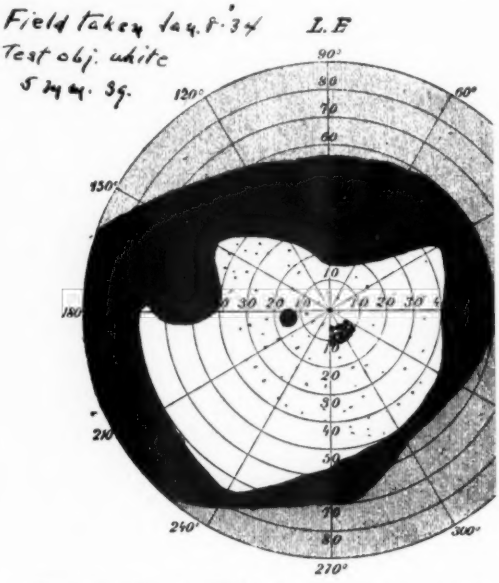


Fig. 2 (Post). The field on January 8, 1934, taken with the same test object.

seemed to react very well to the operation, yet it was felt that each further intervention was becoming less and less likely to succeed and that upon this attempt must rest the ultimate outcome. A large dissection was therefore made, down and slightly outward. The

inferior rectus was again resected. A satisfactory current of forty milliamperes was obtained, and twenty-four pins were easily inserted through the sclera. The pin, in each instance, was pressed in until the coil itself came into contact with the sclera. Eighteen small pins were used in the periphery of the field, and six large ones in the central portion. A Graefe knife was thrust through the center of the treated area. No hemorrhage took place, but considerable subretinal fluid escaped. The eye was quite soft at the close of the operation. Eight days later some detached retina could still be made out. On February 5, fourteen days after the operation, no detachment was seen. The patient had been flat in bed until this time. He was discharged, but told to remain in bed for two weeks longer, excepting that he was to call at the office one week after discharge, returning home to bed immediately. At this visit, on February 12, the vision was 18/150. No detachment could be made out anywhere, and the patient thought that vision generally was much improved. The next examination was made on March 5, at the office. On this occasion, the vision was 18/150 to 18/120. There were many floating threads in the vitreous, but the retina appeared to be firmly in place throughout. There was no suggestion of detachment anywhere. The field, taken with a five-millimeter square, white test object, was normal in extent. There were no constrictions at any point.

The patient was last seen on April 13*, at which time he was shown before the Ophthalmic Section of the St. Louis Medical Society. He reported at this time that vision had steadily improved, despite the fact that he had been under an unusual strain, entailing considerable rather heavy physical exercise. His wife, who has been his mainstay, conducting much of the automobile business in which their interests lay, had suffered a heart attack, as a result of which she was unable to continue her usual activities, and a far greater portion of the work than customary was thrown upon his shoulders. Examination showed that no detachment had appeared and that the vitreous was continuing to clear. The vision could not be taken, nor fields made at this time, as no facilities were available.

This case is of interest chiefly because of the successful outcome despite constant and violent nystagmoid movements. It is also somewhat unusual in that an eye previously damaged by inflammation and penetrating injury was able to sustain repeated operative procedures, resulting eventually in complete reattachment of the retina.

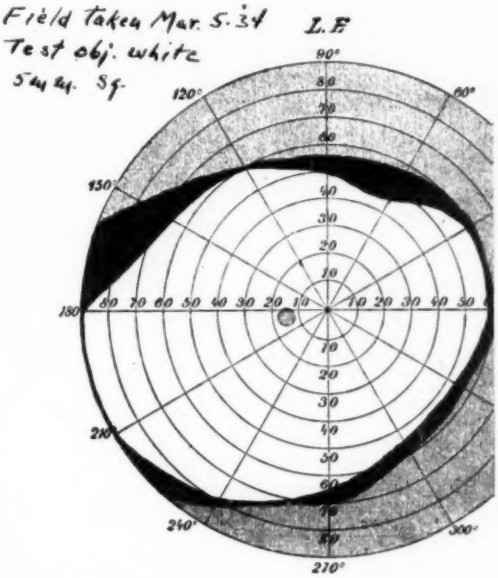


Fig. 3 (Post). The field on March 5, 1934, taken with the same test object.

Incidentally, this case may be added to the rapidly growing number of those reported where cataract formation, following trauma, has been confined to the region of the injury. It should be noted that this localization took place without the intervention of the iris acting to seal the wound, since, during the convalescence from that injury, the iris was not in contact with the opening in the capsule of the lens.

524 Metropolitan Building.

* In November the retina was still completely reattached and field and vision were as on March 5.

HISTOPATHOLOGY OF COLOBOMA OF THE CHOROID AND OPTIC-NERVE ENTRANCE

M. L. Folk, M.D., F.A.C.S.
CHICAGO

Report of a microscopic study of the coloboma of the choroid, probably the first one in the United States. In this specimen, no inflammatory products nor mesodermal strands were found in the region of the coloboma. Retinal folds seemed to be the cause of the formation of the latter, thus supporting the ectodermal thery of coloboma formation. The defect at the disc was not in the optic nerve nor its sheath, but at its entrance. The choroid and pigment epithelium were absent; the retina was in a state of maldevelopment but showed no fatal gap. From the Department of Ophthalmology, the University of Illinois, College of Medicine. Read before the Chicago Ophthalmalogical Society, March 19, 1934.

The ophthalmoscopic picture of coloboma of the choroid is well known to every ophthalmologist. It was first observed by V.Ammon[1] in 1831, and drawn by Ruete[2] in the same year. Since then, numerous clinical case reports have appeared both in the European and American literature. Anatomic studies of this anomaly, however, are few and have been contributed solely by Europeans, notably by Hess[3], Hannel[4], Bach[5], Deutschmann[6], Bock[7], Von Hippel[8], and Elschnig[9]; but the writer was unable to find a single case in the American literature. This, coupled with the fact that there is still a great divergence of opinion as to the microscopic findings and their interpretation, prompted the study and presentation of this case.

Case Report

A female patient, aged 46 years, came to the eye clinic of the University of Illinois, College of Medicine, in June, 1932, complaining of severe, persistent pain in the left eye of 5 weeks' duration. She stated that her left vision had been limited to light perception since infancy and that she had been told upon arrival in this country that she had a coloboma of the iris. Her left eye would frequently become injected, but she had had no pain until 8 years previous to admission, when she had suffered an attack of severe pain, marked injection, photophobia, and lacrimation, for which she was treated at the Illinois Eye and Ear Infirmary for a period of 8 weeks. The eye then quieted down and did not trouble her until the onset of the present symptoms.

Examination revealed the right eye to be normal, except for a small macula in the cornea, just below the center, and the right vision was 1.0—1. The left eye had no light perception. The left lids were swollen and there was moderate conjunctival and ciliary injection. The left cornea was steamy, its epithelium contained numerous blebs, and there was an old macula just below the center. The anterior chamber was deeper than normal. The pupil was widely dilated, oval, and fixed. The iris was blue (its mate was grey) and showed a coloboma down and in, at "6-7 o'clock," through which the lower edge of the cataractous lens could be made out. No fundus reflex was obtained and tension was +2. The diagnosis of glaucoma, probably secondary to chronic iridocyclitis, coloboma iridis, and cataract was made. As conservative treatment failed to relieve the pain, enucleation was performed on August 2, 1932.

When the bulb was opened some time later for an internal macroscopic examination, the coagulated vitreous was found to be crowded against the anterior one third, pushing the iris-lens diaphragm forward. The papilla appeared to be enlarged, 3 × 4 mm. in diameter, and deeply excavated. A one-centimeter white, oval-shaped depressed area, traversed by retinal vessels, was seen just below the disc. The sclera in that region was thinned and bulged posteriorly. A diagnosis of coloboma of the choroid was made and another small calotte removed to permit vertical sections through the colobomatous area. On the removed calotte the retina could easily be stripped from the

underlying sclera, but no traces of choroid or pigment epithelium were found.

By our usual technic, the bulb was fixed for sectioning. However, due to the formation of a large air bubble in the center of the globe, no serial sections could be made and only eight slides were prepared and studied microscopically. Briefly, they showed the following:

1. The cornea was infiltrated both superficially and in the deep layers, particularly in the latter. Some superficial and deep vascularization was also noted (fig. 1).

2. The sclera was normal, except in the region of the coloboma, where it was reduced to 2/3 or 1/2 of its thickness (fig. 1).

3. The iris was absent in the prepared sections.

4. The ciliary body was quite infiltrated with leukocytes (fig. 1).

5. The choroid was almost entirely absent in the lower portion, except for small stretches of 2-3 mm. from the ora and 1-2 mm. from the disc margin, where it could be recognized as such. The lamina vitrea, which normally goes farthest into the nerve-entrance canal, stopped short 2-3 mm. from the latter. In the upper part of the globe, the choroid did not begin for a millimeter or so from the disc margin, and the lamina vitrea did not appear for 2-3 mm. from it. Thence down to the ora, the choroid was normal (fig. 1).

6. The retina over the site of the choroidal defect was in a state of maldevelopment, consisting only of several rows (in some places of only 1-2 rows) of nuclear elements, the other layers not being identified. At the lower border of the nerve entrance the retina was folded under the overhanging scleral margin, forming a good-sized cyst in some sections (figs. 2 and 3).

7. The disc appeared to be very large, due to the fact that, on the side of the coloboma, the wall of the scleral canal was pushed posteriorly, forming a cystic ectasia and an overhanging margin. Besides, the optic nerve having entered the eye in an exaggerated obliquity had caused a retraction of the lower part of the disc. The nerve itself and its sheaths were normal. In other words, the coloboma was outside of the nerve sheaths (fig. 3).

The microscopic diagnoses were as follows: (1) Coloboma of choroid and optic-nerve entrance—congenital. (2) Chronic iridocyclitis. (3) Pannus degenerativus. (4) Secondary glaucoma.

Comment

The above findings, in the author's opinion, tend to clarify the following, long-debated questions: (1) Is the pigment epithelium present or absent in the coloboma? (2) Is there a gap in the retina? (3) What are the factors responsible for the formation of the coloboma? In regard to the first question, Hess and Pause[10] have contended that the pigment epithelium is present as a row of nonpigmented cells. V. Hippel, on the other hand, ciaims that these cells are part of the inner layer of the secondary vesicle, namely, retina, and not of the pigment epithelium. Our specimen corroborated the latter view.

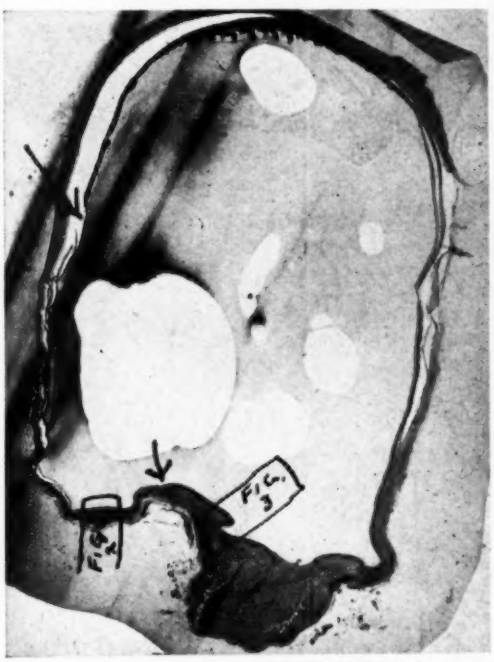


Fig. 1 (Folk). Coloboma of choroid and optic-nerve entrance. Arrows indicate the disappearance of the choroid and extent of the coloboma.

The second question can be definitely answered in the negative; i.e., while the retina may be found in a state of malformation, its total absence could not be demonstrated in our specimen, and has not been found by others. Doubling of the retina with the edges turned out has been noted by a good many observers. This, as explained by Collins

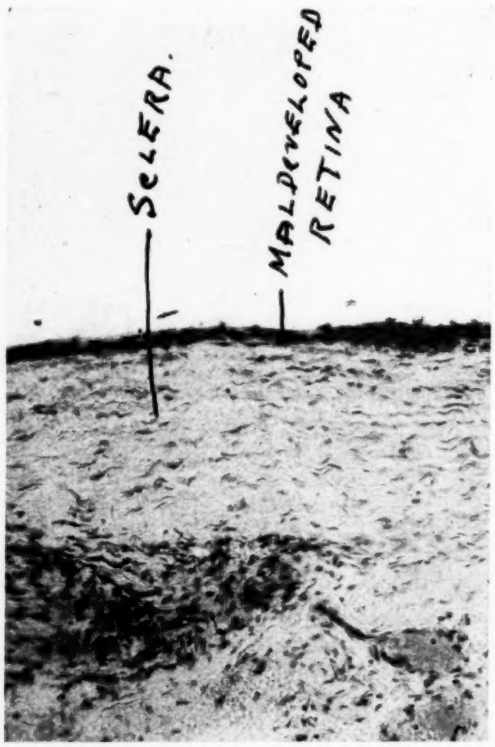


Fig. 2 (Folk). High-powered drawing of figure 1, showing maldeveloped retina.

and Mayou[11], is due to the fact that the inner layer of the secondary optic vesicle grows faster than the outer and the former is, therefore, thrown into folds, especially over the projecting scleral edge, as in our case.

Regarding the third question, namely, the origin of the coloboma, there are three current theories, each of which has many proponents. The first is the so-called inflammatory theory, originated by Deutschmann[6] in 1881, and based on the finding of round cells and pigment in the region of the coloboma in one of his specimens. It holds that the end results of fetal inflammation interfered with the closure of the fetal ocular cleft. This theory held prominence until 1902, and was supported by a good many observers. The second was the mesodermal theory, sponsored by V. Hippel, who claimed to have reëxamined Deutschmann's material and to have found no products of inflammation, but mesodermal strands, which persisted at the optic-nerve entrance and thus interfered with the closure of the fetal cleft. However, since the publication of the excellent experimental work by V.Szily[12] in 1924 and 1926, V.Hippel has modified his view and now believes that the ectodermal theory is, probably, the most tenable, though he still claims that the mesodermal theory cannot entirely be discarded and is the causative factor, at least, in some cases. According to the third, or ectodermal theory, sponsored by V.Szily and Koyanagi[13], anomalies of the optic vesicle in the region of the ocular cleft, such as folds and duplications of the

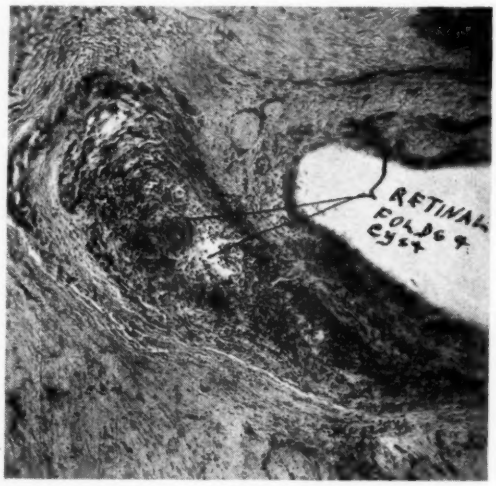


Fig. 3 (Folk). Same as figure 1, showing folds of retina and cystoid spaces.

retina, are responsible for all the colobomata. Duplication of the retina may cause pocket formation between sclera and choroid, in the nerve sheaths, or even in the nerve substance proper. Retinal projections into the vitreous may cause coloboma of the latter. Our case corroborates the ectodermal theory, inasmuch as we found doubling of the

retina and cyst formation at the nerve entrance.

With reference to the coloboma of the optic-nerve entrance, the findings in our sections are similar to those observed by the majority of authors, namely, that the defect, in most cases, is not in the nerve tissue, nor in its sheaths, but in the entrance canal. While the former may be found, as in the case of Calhoun[14], it is, undoubtedly, very rare, and was conspicuously absent in all the anatomic investigations prior to 1900. The clinical diagnosis of coloboma of the optic nerve is, therefore, a misnomer in the majority of instances, as ophthalmoscopically it is impossible to state whether the actual defect is in the nerve tissue itself or in its sheaths, or is merely an extension of the choroidal coloboma. The term should be changed to coloboma of the optic-nerve entrance, as suggested by V.Hippel.

Conclusions

1. A microscopic study of coloboma of the choroid and optic-nerve entrance, probably the first one in the United States, is reported.

2. The choroid and pigment epithelium were entirely absent in this specimen.

3. The retina was present throughout, but in a state of malformation.

4. Neither inflammatory products nor mesodermal strands were found in the region of the coloboma. The presence of doubling of the retina and cyst formation are in support of the ectodermal theory of coloboma formation.

5. The defect at the nerve entrance was found outside of the nerve sheaths, hence the name coloboma of the optic-nerve entrance.

25 E. Washington Street.

References

[1] V.Ammon. Quoted by Parsons, Pathology of the eye. New York, Putnam's Sons, 1906, p. 824.
[2] Ruete. Ibid.
[3] Hess. Arch. f. Ophth., 1890, v. 36, pt. 1, p. 135; and 1892, v. 38, pt. 3, p. 98.
[4] Hannel. Diss., München, 1885.
[5] Bach. Arch. f. Ophth., 1898, v. 45, p. 1.
[6] Deutschmann. Klin. Monatsb. f. Augenh., 1881, v. 19, p. 101.
[7] Bock. Die angeborenen Kolobome des Auges. Wien, Wilhelm Braumüller, 1893.
[8] V.Hippel, E. Arch. f. Ophth., 1903, v. 55, p. 507.
[9] Elschnig. Arch. f. Ophth., 1900, v. 51, pt. 3, p. 391; and 1903, v. 56, pt. 1, p. 49.
[10] Pause. Arch. f. Ophth., 1874, v. 24, pt. 2, p. 84.
[11] Collins, and Mayou. Pathology and bacteriology of the eye. Philadelphia, P. Blakiston's Son & Co., Ed. 2, 1925, p. 19.
[12] V.Szily. Quoted by V.Hippel, in Henke and Lubarsch's Handbuch der speciellen pathologischen Anatomie und Histologie. Berlin, Julius Springer, 1931, v. 11, sect. 2, Auge, pt. 2, p. 120.
[13] Koyanagi. Arch. f. Ophth., 1921, v. 104, pt. 1.
[14] Calhoun. Arch. of Ophth., 1930, v. 3, p. 7.
For the complete bibliography on the subject, the reader is referred to Henke and Lubarsch, pp. 117-128 (see reference 12).

STUDIES IN THE PROTEIN CONTENT OF THE HUMAN AQUEOUS

1. The influence of therapeutic measures
2. Significance in papilledema, papillitis, and other conditions

ELIAS SELINGER, M.D.
CHICAGO

A simple nephelometric method of protein determination of the aqueous for clinical use is described. The diagnostic and therapeutic importance of an increased protein content is discussed. It is shown that in choked disc the protein content of the aqueous is normal while in papillitis it is increased. In case of doubt one can, therefore, differentiate these two conditions by a chemical test which is no more difficult than the Pandy reaction.

In pathological processes characterized by exudates, the increase of the protein content of the aqueous is in direct relation to the severity of the inflammation, while in those characterized by transudates it depends on the location of the lesion. From the Department of Ophthalmology of Rush Medical College of the University of Chicago. Read before the Chicago Ophthalmological Society, March 19, 1934.

Studies of the protein content of the aqueous are not only of academic interest but of value to the clinician from both the therapeutic and the diagnostic points of view. The first record of the chemical analysis of the aqueous appears in the writings of Berzelius[1] in 1831. He studied the aqueous of oxen. Analyses of the human aqueous were carried out by Kletzinsky[2] in 1861. In the past 30 years a great deal of work has been done on this subject in animals and in man. The amount of protein in the normal human aqueous is about 0.02 percent as compared with more than 7.00 percent in the blood plasma. The protein content is increased under certain abnormal conditions; that is, under any conditions which produce a dilatation of the intraocular vessels. This aqueous, which resembles the blood plasma more closely, is called plasmoid aqueous by Duke-Elder[3] and contains more albumin, globulin, immune bodies, etc., than does the normal aqueous. An increase in the protein content, that is, a plasmoid type of aqueous, was found to follow the application of heat to the eye, subconjunctival injections of salt solutions, instillation of pilocarpine, eserine, and dionin, the intravenous injections of hypertonic salt solutions, paracentesis of the anterior chamber, massage of the eyeball, the action of ultraviolet and infrared rays, inflammations of the eye, detachment of the retina, etc. Immune bodies have been demonstrated in minute quantities in the normal aqueous by various observers: agglutinins by Wessely[4] and Römer[5] in 1902, complement in 1903 by Sweet[6], bacteriolysins by A. Leber[7] in 1906, hemolysins by Majischita[8] in 1909, and proteolytic ferments, which explain the disappearance of opaque lens cortex after needling, by Goldschmidt[9], Hayano[10], and Jacinski[11]. These bodies, which are most probably globulins, are markedly increased in inflammations, and also after the use of irritants which cause a vasodilatation and thus an increase in the protein content of the aqueous. Franceschetti[12] found an increase in immune bodies in the aqueous of normal rabbits after the administration of theophylline. Diuretics, according to him, produce an increased permeability of the vessel walls and thus permit the larger molecules to pass through into the aqueous. Positive Wassermann reactions have been obtained in the aqueous by Gilbert and Plaut[13]; positive Kahn tests by Fralick[14]. In some cases, these were negative in the first aqueous, and positive in the second aqueous, after the first aqueous had been evacuated by puncture of the cornea. It is very likely that in these cases the same results would have been obtained on the first aqueous if irritants such as hot dressings for half an hour or massage of the eyeball for several minutes had been tried before the paracentesis. It has been suggested that the good results reported in the treatment of serpiginous ulcers after Saemisch section might be due to an increase in antibodies in the aqueous.

Lussich and Matkovich[15] report seven patients cured in 3 weeks by 3 to 5 paracenteses in addition to the usual treatment for serpiginous ulcer. It would seem that if the results were due to an increase in the amount of antibodies, the same results should be obtained by the use of any of the methods resulting in an increased protein content of the aqueous as enumerated above. Gaedertz and Wittgenstein[16] found in their experiments on dogs that all anion-diffusible substances such as Cl, Po_4, SO_4 can reach the first aqueous provided a certain concentration in the blood has been reached. The cation-diffusible substances, such as Ca, K, etc., on the other hand, do not reach the aqueous, since they are taken up by the tissue cells. They are also more toxic to the body. In the healthy animal with the normal eye, colloids cannot, for all practical purposes, break through the aqueous-blood barrier into the first aqueous. Similar findings have been reported before and since by various writers, such as Leber[17], Duke-Elder[18], Ascher[19], and many others. Kraus and Zondek[20], and Zondek[21] found that there is a close relation between the sympathetic and parasympathetic tonus and the relation of different ions in the plasma. The Ca-ion action is synchronous with the sympathetic, that of the K ion with the parasympathetic. The lessening of the permeability of the vessel wall by the Ca ion is made use of clinically in ophthalmology in the treatment of iridocyclitis with calcium salts. Iodides have been recovered by Schläfke[22] from the aqueous six minutes after their administration by mouth. Other drugs, such as bromides, potassium ferrocyanide, etc., have been similarly found in the aqueous.

Diagnostic Significance

From the diagnostic point of view, studies of the protein content of the aqueous are of great importance. In inflammations of the anterior segment of the eye, the diagnosis of an active process can generally be easily made by the ordinary methods of examination, such as inspection, examination of the window image, oblique illumination, and fluoresceine stain, and, in less pronounced cases, by slitlamp examination. But there are times when one is not certain whether one is dealing with an old healed process, such as an inactive healed keratitis in which the process was of long standing, so that the episcleral vessels have become permanently dilated and the epithelium distorted because of the deposition of mineral salts, *or* with a case of very low-grade iritis or iridocyclitis in which the inflammatory process is so insidious that the slitlamp fails to show posterior corneal deposits or visibility of the beam in the aqueous, and the cell count of the aqueous is only slightly above the normal.

I recently saw two such cases. One was a healed case of keratitis in which a dense opacity extended over practically the entire cornea, so that the posterior surface could not be examined with the slitlamp. Permanently dilated episcleral vessels gave the impression of injection of the bulbar conjunctiva and the corneal epithelium was irregular and stippled in appearance, probably as a result of deposits of the mineral salts which were present. This patient continued to have subjective complaints of photophobia and lacrimation. The protein content of the aqueous was normal, thus definitely excluding an active inflammatory process. The other occurred in a 16-year-old white girl, suffering from a chronic arthritis of the hip. The uncorrected vision was 1.0 in each eye. Neither eye showed any external evidences of inflammation. The left eye had many posterior corneal deposits, visibility of the slitlamp beam in the aqueous, and a marked depigmentation of the iris. The protein content of the aqueous was 0.08 percent. The right eye showed no posterior corneal deposits, but a slight increase of the cell count of the aqueous, discovered only after a number of very careful slitlamp examinations, after the protein content of the aqueous had been found to be increased to 0.04 percent on the first examination. The slitlamp examinations were made at weekly intervals. This patient then had a bilateral low-grade uveitis. The pathological process of the

right eye would have gone undetected for some time without the protein determination of the aqueous. A low or normal cell count of the aqueous, as seen with the slitlamp, does not necessarily rule out even an extensive pathological process, as is proved by the following case: A 40-year-old white male had a nonperforating injury of the left eye, resulting in total blindness. He was seen 3 weeks after the accident, at which time the eyeball was soft, painless, and moderately injected. There were no posterior corneal deposits nor was there any increase of cells in the aqueous, but a marked visibility of the slitlamp beam in the aqueous and a large grayish mass, apparently a completely detached retina, posterior to the lens. The cell count of the aspirated aqueous was 20 leucocytes per cubic millimeter and the protein content 0.30 percent.

The protein content of the aqueous is increased not only in inflammations and other pathological processes of the anterior segment, but also in those involving the retina, choroid, vitreous, and intraocular portion of the optic nerve as well. Other causes of an increased protein content, such as chemical, mechanical, and other irritative influences, must, of course, be ruled out.

Method

The method of protein determination used in this series of cases is based on the trichloracetic-acid test described by Mestrezat and Magitot[23]. Their procedure is as follows: A standard solution of egg albumin, containing 1.0 gm. of albumin in 1000 c.c. of normal salt solution, is prepared by beating the white of 3 eggs to a snow with an equal quantity of 0.8-percent NaCl solution. This is diluted to 5 volumes with normal salt solution and filtered through filter paper. This solution contains 1.0 gm. of egg albumin to 1000 c.c. of salt solution. [This should be checked at this stage by determining the total N by the Kjeldahl method. The albumin content is determined from this by multiplying the total N by 6.25.—Author's note]. As a preservative, 0.5 gm. of mercury cyanide is added. From this, dilutions containing 0.1, 0.2, 0.3, 0.4 and so on up to 1.0 gm. per 1000 c.c. are prepared in test tubes and used for the tests. These solutions keep for a long time when preserved on ice. Eleven hanging-drop slides are placed on a glass-topped box painted black on the inside (the black box acts as a contrast medium for the readings) and 10 of them are marked to correspond to the 10 dilutions of egg albumin. One drop of each of the 10 dilutions is placed on the concavity of the corresponding slide and a drop of the aqueous to be tested on the eleventh slide. Now one drop of 20-percent trichloracetic acid is quickly added to each drop on the eleven slides. Each slide is then quickly but gently moved with a rotatory motion on the glass top in order to mix the acid with the albuminous solutions. Within a few seconds a grayish opacity appears on each hanging-drop slide, the degree of turbidity depending on the amount of albumin in each sample. The turbidity of the unknown sample is compared with this scale of turbidities and the slide placed between the two which it resembles most closely for a more careful comparison. If the turbidity corresponds to that on the slide marked 0.6, the protein content of the aqueous is recorded as 0.6 gm. per 1000 c.c. of aqueous, or 0.06 percent. The different turbidities are well enough differentiated against the black background so that one can make the readings without any difficulty. Daylight is essential for this test and the glass-topped black box simplifies the readings. It is important to have all the drops of equal size and every piece of apparatus should, of course, be chemically clean; that is, free from albumin and other impurities.

I have found that 5-percent sulphosalicylic acid, as used in spinal fluid analyses, gives a more complete precipitation of the protein and therefore more marked opacities, thus making the readings, especially in the lower half of the scale, easier. The standard solution can also be prepared in other ways, as by beating the white of the eggs to a snow (to mix the egg with the salt solution) with an equal quantity of normal salt solution, diluting this with 100 or

Case Reports

Eye Findings (with Case Number)	Other Important Findings	Diagnosis	Protein Content of Aqueous In percent
(1) Bilateral papilledema of 3 diopters. Numerous hemorrhages on and about the discs.		Brain tumor, proved by operation.	Between 0.01 and 0.02
(2) R. papilledema 4 diopters. L. papilledema 3 diopters. A few hemorrhages and grayish degenerative areas near the discs. L. abducens palsy.	Increased pressure of spinal fluid. Relief of headache, vomiting, and abducens palsy after spinal puncture.	Brain tumor.	0.02
(3) R. papilledema 2 diopters. L. papilledema 3 diopters.		Brain tumor. Subcortical glioma found on operation.	0.01 to 0.02
(4) R. papilledema 3 diopters. L. 1.5-diopter swelling of nasal half of disc.		Brain tumor found on operation.	R. 0.02
(5) Bilateral papilledema 4 diopters.		Brain tumor found on operation.	0.02
(6) R. papilledema 2.5 diopters. L. papilledema 4.5 diopters. Many retinal hemorrhages and grayish areas of nerve-fiber degeneration.		Brain tumor, verified by operation.	0.02
(7) Bilateral descending optic atrophy. Atrophic excavations of the discs.	X-ray showed erosion of the sella turcica.	Tumor of the hypophysis confirmed at operation.	0.02
(8) Bilateral papilledema of 3 diopters. Marked congestion of both discs.		Abscess of frontal lobe; verified by operation.	0.02
(9) R. papilledema of 3 diopters. L. blurring of nasal disc margin.	Increased intracranial pressure as a result of skull injury. Spinal-fluid pressure 290 mm. of spinal fluid.	Skull injury with increased intracranial pressure.	R. between 0.01 and 0.02
(10) Bilateral papilledema of 3 diopters. Marked sclerosis of retinal vessels and patches of arteriosclerotic retinitis in both eyes.	Myocarditis with hypertension. Neurologically negative.	Arteriosclerosis of both ophthalmic arteries.	Between 0.01 and 0.02
(11) Bilateral papillitis of 2.5 diopters; small increase in cell count of aqueous. No posterior corneal deposits. Irides normal.	Injuries to orbital tissues sustained in automobile accident.	Bilateral papillitis.	0.10
(12) L. papillitis of 3 diopters.	X-ray showed a L. ethmoid infection. Spinal puncture, etc., negative.	L. papillitis secondary to acute ethmoiditis.	L. 0.04
(13) Bilateral neuroretinitis of 2 diopters, exudates and a few hemorrhages in the retina.	B.P. 208/124, blood urea N 256.00, creatinin 14.00. The patient died in a few weeks.	Albuminuric neuroretinitis.	0.04

Case Reports (Continued)

	Eye Findings (with Case Number)	Other Important Findings	Diagnosis	Protein Content of Aqueous In percent
(14)	Bilateral papillitis of 2 diopters. Exudates in the macular regions and a few hemorrhages around the nerve heads.	B.P. 215/150, other findings of nephritis.	Malignant nephrosclerosis.	0.03
(15)	Bilateral neuroretinitis with 2.5 diopters swelling of each disc. Exudates and hemorrhages in both eyegrounds.	B.P. 185/135, other findings of nephritis.	Malignant nephrosclerosis.	0.05
(16)	Bilateral neuroretinitis with 2-diopter swelling of the right disc, 3-diopter swelling of the left. A few exudates and hemorrhages in both fundi.	B.P. 246/146, blood urea N 54.00, creatinin 3.0.	Malignant nephrosclerosis.	L. 0.04
(17)	Bilateral grayish-yellow plaques, moderate number of retinal hemorrhages, moderate sclerosis of the retinal vessels.	Glycosuria and hyperglycemia.	Diabetes mellitus.	0.10
(18)	R. disseminated active chorioretinitic spots.		Acute disseminated chorioretinitis.	0.12
(19)	Bilateral retinitis circinata.		Retinitis circinata.	0.03
(20)	Bilateral marked angiosclerosis with obliteration of arteries in places. Veins dilated and tortuous—in places obscured by edema of the retina. Numerous retinal hemorrhages. Both retinae edematous.	Impairment of right vision of 4 weeks' duration; of left vision, 1 day.	Hemorrhagic retinitis as a result of pressure of sclerosed arteries on the retinal veins.	L. 0.12
(21)	R. scattered spots of active chorioretinitis.		R. active disseminated chorioretinitis.	0.16
(22)	L. obliteration of the central retinal artery. Edema of the retina. Cherry-red spot in the macula.	Sudden loss of vision of 2 days' duration.	L. obliterating endarteritis of the central artery.	0.24
(23)	No redness of either eye. R. slight increase of cells in aqueous found only after repeated slitlamp examinations. No posterior corneal deposits or other findings. L. posterior corneal deposits, increased cell count in aqueous. Depigmentation of iris.		Bilateral chronic uveitis.	R. 0.04 L. 0.08
(24)	L. chronic iridocyclitis with secondary glaucoma.		L. chronic iridocyclitis with secondary glaucoma.	L. 0.12
(25)	Bilateral subsiding interstitial keratitis.		Bilateral subsiding interstitial keratitis.	R. 0.10 L. 0.08

Case Reports (Continued)

Eye Findings (with Case Number)	Other Important Findings	Diagnosis	Protein Content of Aqueous In percent
(26) L. healed keratitis with dilatation of episcleral vessels and stippling of the corneal epithelium as a result of calcium deposits.	Photophobia and lacrimation.	Healed old keratitis.	0.02
(27) Bilateral subsiding chronic iridocyclitis with secondary glaucoma.		Bilateral chronic iridocyclitis with secondary glaucoma.	L. 0.06

200 c.c. of salt solution, filtering through filter paper and determining the total N by the micro-Kjeldahl method. From this the total protein can be calculated and the proper dilutions made so as to get a standard solution containing 0.1 percent of egg albumin, from which the other 9 dilutions are made. Regardless of whether the standard solution is made one way or another, it is well to check the protein content by a nitrogen determination, not only when it is first prepared but 3 or 4 times a year after that.

The anterior-chamber puncture can be made directly with a sharp 27-gauge hypodermic needle, but, since the cornea is very tough, the procedure is simplified by puncturing the clear cornea first with a Ziegler knife needle, which is introduced 1 mm. from the limbus (in order to avoid the conjunctival vessels along the limbus). The hypodermic needle on a 1-c.c. tuberculin syringe is then introduced along the oblique tract made by the knife, and the aqueous carefully aspirated. If one has difficulty in finding the point of entry of the knife, a drop of fluorescein will show its location. If the eyeball is fixed at the nasal horizontal limbus, the globe will not rotate and proper counterpressure can be exerted. It is best not to empty the anterior chamber too completely, as this would cause a dilatation or, very rarely, even a rupture of the vessels of the iris and ciliary body, thus increasing the protein content. The anterior chamber re-forms in about half an hour, but the second or plasmoid aqueous is very rich in protein for about 12 hours.

In this group of 16 cases there were 15 with swelling of one or both discs. Six were proved, by operation, to be due to brain tumors. The seventh patient had a frontal-lobe abscess which was successfully drained by operation. Case 9, of a choked disc due to an increased intracranial pressure, was as a consequence of a skull injury following an automobile accident, while case 10 belongs to the small group of cases in which a papilledema is a result of conditions other than an increased intracranial pressure—in this case sclerosis of the ophthalmic arteries; case 7, a descending optic atrophy secondary to a tumor of the hypophysis. In all these 9 cases of papilledema and in the case of descending optic atrophy, the protein content of the aqueous was normal in amount, in spite of the fact that retinal hemorrhages and even grayish areas of nerve-fiber degeneration were present in some. These findings agree with those of Magitot and D'Autrevaux[25] who found a normal protein content of the aqueous in choked disc.

In two patients, cases 11 and 12, who had papillitis of an inflammatory origin, the protein content was respectively twice and five times the normal. In four patients with papillitis or neuroretinitis of noninflammatory origin, cases 13 to 16 inclusive, in which the papillitis was of renal origin, the protein content of the aqueous was twice to three times the normal. Protein-rich products from papillitis reach the anterior chamber from the posterior half of the eye by a process of diffusion. In the 6 cases of papillitis, the protein content of the aqueous was definitely increased. We

can say, therefore, that in choked disc or papilledema the protein content of the aqueous is normal while in papillitis or neuroretinitis, even of noninflammatory origin, it is definitely increased. The differentiation of choked disc and papillitis by this method has not heretofore been described in the literature.

This group of 11 cases comprises a number of conditions other than papillitis and papilledema. A study of the protein content of the aqueous shows, as illustrated in cases 23 and 26, that it is possible, in doubtful cases, to determine by the protein content of the aqueous whether one is dealing with an active or healed process. An increase in the protein content speaks for an active process even though the slitlamp and other methods of examination reveal nothing pathological. Among the other cases are some that are inflammatory in origin and that, as one would expect, show a definite increase of aqueous protein, the amount of increase depending on the severity of the inflammatory process. Some of the noninflammatory-disease processes, such as case 20, one of familiar hemorrhagic retinitis, which simulated a central-vein thrombosis but which in reality was due to pressure of the sclerosed central artery on the vein, and case 22, in which the picture of an embolus of the central retinal artery was brought about by an obliterating endarteritis of the central artery, give a very marked increase in the protein content of the aqueous. In both these conditions there are no real inflammatory changes. The edema of the retina is due to the transudation of albumin-rich fluid into it. This merely proves what we know from general pathology; namely, that although inflammatory exudates are richer in proteins than transudates, the latter vary markedly in their protein content. This variation depends upon the location of the transudate. In subcutaneous edema, for instance, the fluid has a protein content of less than 0.10 percent while the protein content in pleural transudates can be more than 5 percent. From this series of cases we can deduce that the transudate in papilledema is very poor in protein constituents while the transudates of the retina and choroid are very rich in protein.

Conclusions

1. Certain therapeutic agents cause a dilatation of the blood vessels of the eye and an increase of the permeability of the vessel walls, thus increasing the protein content of the aqueous. Immune bodies, which are found only in minute quantities in the normal aqueous, are found in large quantities in the plasmoid aqueous.

2. It is possible to differentiate a papilledema from a papillitis by the protein content of the aqueous. The protein content of the aqueous is normal in choked disc, even though retinal hemorrhages and grayish areas of nerve-fiber degeneration are present. Papillitis of inflammatory and noninflammatory origin has a definitely increased protein content of the aqueous. This test should be of value as an additional diagnostic aid when one is in doubt as to whether one is dealing with a case of papillitis or papilledema.

3. An increased protein content of the aqueous is definite evidence of an active inflammation, or other active pathological process, characterized by the transudation of a fluid high in protein constituents. This test can be used, in doubtful cases, to differentiate an active from a quiescent process.

4. Transudates vary in protein content with their location. Those in the optic nerve are poor, while those in the retina and choroid are rich in protein constituents.

55 East Washington Street.

Bibliography

[1] Berzelius. Lehrbuch der Chemie, 1831, v. 4, p. 442.
[2] Kletzinsky. See E. Von Jäger's Ueber die Einstellungen des dioptrischen Apparatus (Chemische Zusammensetzungen der Augenflüssigkeiten nach Analysen von Kletzinsky). Wien, 1861.
[3] Duke-Elder. The nature of the intra-ocular fluids, Brit. Jour. Ophth., Monograph Supplement III, 1926-1927.

[4] Wessely. Klin. Monatsbl. f. Augenh., 1902, v. 40, no. 2, p. 267.
[5] Römer. Arch. f. Ophth., 1902, v. 54, no. 1, p. 99.
[6] Sweet. Centralbl. f. Bakteriol., 1903, v. 33.
[7] Leber, A. Arch. f. Ophth., 1906, v. 64, p. 413.
[8] Majischita. Klin. Monatsbl. f. Augenh., 1909, v. 47, p. 62.
[9] Goldschmidt, M. Arch. f. Ophth., 1914, v. 88, p. 405.
[10] Hayano. Jubilee volume of Prof. Komoto, 1921.
[11] Jacinski. Abst. in Klin. Monatsbl. f. Augenh., 1924, v. 74, p. 805.
[12] Franceschetti. Ber. ü. d. Versam. d. deutsch. ophth. Gesell., 1928, v. 47.
[13] Gilbert, and Plaut. Arch. f. Augenh., 1921, v. 90, p. 1.
[14] Fralick, F. B. Arch. of Ophth., 1933, December.
[15] Lussich, and Matkovich. Ber. ü. d. Versam. d. deutsch. ophth. Gessell., 1928, v. 47, p. 288.
[16] Gaedertz, and Wittenstein. Arch. f. Ophth., 1927 and 1928, v. 119, pp. 395, 755, and 771.
[17] Leber, T. Graefe Saemisch Handb. d. ges. Ophth., Ed. 2, 1903, v. 2, p. 207.
[18] Duke-Elder. Brit. Jour. Ophth., v. 10, pp. 1-29.
[19] Ascher, K. W. Arch. f. Ophth., v. 107, p. 247.
[20] Kraus, and Zondek. Klin. Wchnschr., 1922, v. 1, p. 1773.
[21] Zondek. Deutsch. med. Wchnschr., 1922, v. 50, p. 391.
[22] Schläfke. Arch. f. Ophth., 1879, v. 25, pt. 2, p. 251.
[23] Mestrezat, W., and Magitot. Ann. d'Ocul., 1922, June, v. 159.
[24] Magitot, A., and D'Autrevaux. L'humeur aqueuse en pathologie oculaire. Soc. d'Opht. de Paris, 1924-1925.

RETINITIS PROLIFERANS IN DIABETES

Case report

GILBERT C. STRUBLE, M.D.
SAINT LOUIS

A case of retinitis proliferans in a woman 39 years of age, with diabetes, arteriosclerosis and moderate intermittent hypertension is reported. The course of the disease dating from the first noted symptoms of blurring, until the vision in each eye was reduced to the ability to count fingers, with eccentric fixation, was twenty-nine months. During this period it is probable that her diabetes was not well controlled because of an unsuspected high renal threshold to sugar. The fundus findings of three similar cases are reviewed. From the department of Ophthalmology, Washington University School of Medicine.

Retinitis of the diabetic type is often sufficiently characteristic to justify a presumptive diagnosis of diabetes mellitus from the ophthalmoscopic findings alone. That it rarely occurs in uncomplicated cases of severe diabetes (diabetes gravis), but when present is nearly always found in mild chronic diabetes with associated vascular or renal disease, is generally admitted. Many so-called types or grades have been described.

Hirschberg[1] in 1890 classified them into three main types:

1. The entirely characteristic inflammation of the central region with small bright spots, usually also with hemorrhagic points.
2. Hemorrhages of the retina with inflammatory and degenerative changes.
3. Rarer forms with pigment disturbances and degeneration, the connection of which with the primary disease is yet to be demonstrated.

He believed the central punctate type was due to diabetes alone and thought that the occasional albuminuria was without significance though he did recognize a mixed form in which edema and exudates, characteristic of nephritis, appear.

Altnow[2] in 1927 described the retinal changes in diabetes as being:

1. Increased redness of the retina.
2. The presence of punctuate hemorrhages.
3. Grayish white spots in the macula.
4. Occasionally a fan-shaped figure in the macula.
5. Frequently arteriosclerosis of the retinal vessels.
6. Occasionally choroidal sclerosis.

Cohen[3] believes these deep circumscribed punctate hemorrhages to be a result of diapedesis of red-blood corpuscles from the terminal capillaries into the deeper layers of the retina.

The occasional occurrence of lypemia retinalis, preretinal hemorrhages, and massive or slight extravasations into the vitreous are other complications of this metabolic disease involving the posterior segment of the globe.

While retinitis proliferans is usually mentioned as one of the ocular complications of diabetes, very few cases have been reported where this process in itself was sufficiently extensive to cause serious visual impairment, except in those instances of retinal detachment, a result of contraction of cicatricial vitreous bands.

Friedenwald[4] in 1925 described such a case in a diabetic of middle age. His patient had a blood sugar of 227 mg. per 100 c.c. of blood, a 3-percent urinary sugar and a blood pressure of 140/80.

"In the right eye a large mass of convoluted blood vessels projected forward from the nasal side of the disc excavation for a distance of four diopters. The left eye also showed the convoluted blood vessels from the disc into the vitreous. Both eyes showed numerous punctate hemorrhages."

He also mentioned two other known cases, one described by Nettleship[5] in 1888 in a man, aged 48 years, who had had diabetes for two to three years.

"Over the whole central region the retina was edematous and hazy, in some parts densely clouded. Near the yellow spot were densely opaque yellowish clumps of deposit. The retinal veins were distended and in various spots there were a few scattered blood spots. Close to the fovea centralis two or three vessels of medium size suddenly appeared in the retina, the larger of them seen at its apparent emergence from the choroid was followed up 2.50 diopters anteriorly and was found to divide into net work of minute vessels which projected forward in the form of fine loops into the vitreous where the most prominent of them were seen with plus 6.00 diopters. On a few of these loops an appearance of small swellings, perhaps capillary aneurysms could be distinctly seen."

The other case was reported by Lawson[6] in 1899 who described the retinal findings in a man 54 years of age, a diabetic of three and one half years' duration. "In this patient connective tissue appeared as feathery tufts arising from a central stalk richly permeated with blood vessels."

It is evident this is a disease involving the mesoblastic and not the epiblastic or nervous elements and as such it falls into the classification of mesoblastic retinal disease as suggested by Fuchs[7].

A. Congenital
   (1) Angiomatosis retinae
B. Acquired primary
   (1) abnormal conditions of the blood
      (a) diseases of the blood
      (b) toxic substances
      (c) clots
      (d) parasites
   (2) abnormal walls of vessels
      (a) spasm; (b) arteriosclerosis; (c) tuberculosis; (d) nephritis; (e) hemorrhages and edema

Case history. Mrs. M. W., white, aged 39 years, was referred to the eye clinic at Washington University on March 31, 1931, because of failing vision in the left eye, of five months' duration. This had come on very gradually, there having been no pain nor redness of the eyes at any time. The visual acuity on that day was O.D. 6/5; O.S. 6/60. She was a known diabetic of four years' duration and had been treated in the metabolism department for one year, being kept free from urinary sugar and without symptoms on dietary restrictions alone.

The ocular examination on admission to the eye clinic showed nothing abnormal externally. The media of each eye were clear, only the fundus findings being of interest. Ophthalmoscopy revealed many small hemorrhages, some dark and circumscribed, of the so-called deep form, while others were of the superficial flame-shaped variety. There were no exudates. The arteries showed slightly increased light reflexes and the veins indentures and slight displace-

ment at some of the arterio-venous crossings. Her refraction was:

O.D. +0.50 sph. ⌯ +0.25 cyl. ax. 150°. vision = 6/5
O.S. +1.25 sph. vision = 6/7.5

This correction was ordered and then she was sent back to the diabetic clinic for follow up. She did not again present herself for ocular examination until May 6, 1932 (fourteen months later). Her vision on that day was O.D. 6/10; O.S. 2/60 (with her correction). Externally the eyes remained negative. Ophthalmoscopy showed a large area of retinitis proliferans which was most marked on the nasal side of the disc of the left eye. This extended forward 8 diopters into the vitreous. Numerous punctate hemorrhages were still present. The right eye showed numerous punctate hemorrhages, as in the left eye, with a similar picture of retinitis proliferans developing here also.

Five months later she returned with the complaint of failing vision in the right eye. The vision was O.D. 6/12—; O.S. ability to count fingers at two feet with eccentric fixation. Retinoscopy, right eye, under cycloplegiac was: +3.00 sph. The light reflex appeared quite normal. Her findings on the range however proved to be: +0.50 sph. ⌯ +0.50 cyl. ax. 180°. vision = 6/12. I explain this discrepancy between the skiascopic and range findings on the fundus picture, right eye, by the existence of an area of about two diopters, elevation immediately surrounding the disc, which extended laterally, above, and below, gradually shelving off to normal retina nasally. This tissue appeared to be composed of a dense mesh work of interlacing and anastomosing, newly formed venous radicles and connective-tissue strands, lying in front of the retinal vessels. Scattered throughout the more normal retina were numerous deep, circumscribed hemorrhages, some of which showed a confluence by these newly formed vascular channels, which in a few instances were linked with the larger retinal veins. One Roth spot was noted nasally from the papilla.

I believed that with the retinoscope I was actually measuring this proliferating elevation; whereas on the range, since the perceptual retinal elements were lying behind this mass, much less plus was required to obtain the sharpest visual acuity. This variance of two diopters also coincided with the direct measurable elevation of the tissue with the ophthalmoscope. The fundus picture of the left eye was much more abnormal. An advanced retinitis proliferans was present there, forming a vascular cone entirely surrounding but at no point encroaching on the papilla. The disc details were distinct and the appearance was that of looking down a funnel with the disc at the apex. This cone extended forward for a distance of 8 diopters and then abruptly leveled off to normal retina in the extreme periphery, which was best seen with the aperature. Glasses ordered at that visit were O.D. +0.50 sph. ⌯ +0.50 cyl. ax. 180°. vision = 6/12, with +2.50 sph. added for near, which enabled her to read five-point type at twelve inches from the eyes.

On her return, two weeks later, she had to be led into the examining room. She stated that on the preceding day a red cloud had come over the right eye. The vision, right eye, was now 6/60.

Ophthalmoscopy revealed that there had been an extensive hemorrhage into the proliferating mass which had split down through the center of the macular area displacing the most anterior part forward 6 to 8 diopters.

Immediate hospitalization was recommended for more thorough study.

Her family history was negative except for the fact that her father had died of heart disease.

Physical examination was negative except for very slight sclerosis of the radial arteries. Careful investigation from the standpoint of focal infection showed nothing other than slight tonsillar scarring. Daily blood pressure determinations while in the hospital showed a variation between 110/80 and 150/85. Blood serology and cytological studies were negative. On entry her urine was sugar free but a fasting blood sugar on that same day showed 206 mg. per 100 c.c. Aside from the high blood sugar, the blood chemistry showed

nothing abnormal. During her hospitalization daily blood-sugar determinations disclosed that 30 units of insulin a day were required to maintain the normal blood-sugar level. This was 25 units more than she had been receiving as an out-patient in the dispensary.

Before her discharge she underwent a tonsillectomy. Since that time up to the present her vision, right eye, has slowly failed, being now, as in the left eye, the ability to count fingers at two feet with eccentric fixation.

Both fundi now show the previously described cone of proliferating retinitis which surrounds but does not encroach on the disc, the details of which remain sharp and appear as though at the bottom of a grey funnel.

The course and control of the diabetes are of especial interest.

From the date of her first ophthalmic examination on May 31, 1931, until April 11, 1933, a period of nearly two years, she examined her urine each day at home and on each visit to the outpatient department, once each month, this was repeated. On only two instances was there any sugar in the urine. Once, on September 15, 1931, and once, on January 1, 1932. Of significance was the fact that on three instances, October 18, 1932, December 1, 1932, and April 11, 1933, the urine showed no trace of sugar, yet fasting blood-sugar determinations on those days showed 229, 206, and 245 mg. of sugar per 100 c.c. of blood, respectively.

During the two years of the known retinal disease, when it was thought that her diabetes was well controlled, as evinced by repeatedly negative urine examinations over a period of many months, it is probable her blood sugar was consistently over 200 mg.

The significant features here were the unsuspected high renal threshold the intermittent hypertension, and the early arteriosclerosis in a woman 39 years of age.

Whether or not the progress of the retinal disease could have been stopped or delayed by more adequate control of the diabetes as based on blood sugar, rather than on urinary determinations, however, is uncertain. Surely in any similar case with such a hopeless outlook and so little to be offered, nothing should be neglected which might hold any possibility of the control of such a disastrous and progressive disease.

524 Metropolitan Building.

References

[1] Hirschberg. Deutsch. med. Wchnschr., 1890, v. 16, p. 152. Centralbl. f. Augenh., 1891, pp. 15-18-68.
[2] Altnow, H. O. Changes in the eye grounds in vascular disease and in related conditions. Arch. Int. Med., 1927, Dec., v. 40, p. 757.
[3] Cohen, M. The eye in diabetes mellitus. Arch. of Ophth., 1929, Nov., v. 2, p. 529.
[4] Friedenwald, H. Diabetic retinitis. Jour. Amer. Med. Assoc., 1925, v. 85, pp. 428-434.
[5] Nettleship, E. Trans. Ophth. Soc. U. Kingdom, 1888, v. 8, p. 159.
[6] Lawson, A. Trans. Ophth. Soc. U. Kingdom, 1899, v. 19, p. 288.
[7] Fuchs, E. Classification of retinitis. Arch. of Ophth., 1930, April, v. 3, pp. 393-402.
Dirion, J. K. Diabetic retinitis. Arch. of Ophth., 1933, May, v. 9, pp. 829-839.
Gifford, S. R. Ocular complications of diabetes. Medical Clinics of North America, 1928, Sept., v. 12, p. 423.
Wagener, H. P., and Wilder, R. M. The retinitis of diabetes mellitus. Jour. Amer. Med. Assoc., 1921, Feb., v. 76, p. 515.

XANTHOMATOSIS OF THE ORBIT (LIPOGRANULOMA)

ROBERT MERRIAM ROGERS, M.D.
BROOKLYN, N.Y.

This report gives a brief résumé of the types of xanthomatosis and their characteristics, together with a description of a case seen in an adult with diabetes insipidus. There were yellow pigmentation of the skin of the eyelids, and bilateral exophthalmus due to multiple tumors of the orbits. The only bone changes discovered by x-ray examination were enlargement of the sella turcica and changes in the posterior clinoid process. The blood cholesterol was increased, and the biopsy showed lipoid deposits in the tissue. From the Department of Ophthalmology, The Long Island College Hospital, and the Long Island College of Medicine. Read before the Brooklyn Ophthalmological Society, February 15, 1934.

Bilateral exophthalmos of a considerable degree in association with golden-yellow staining and thickening of the skin of the eyelids and diabetes insipidus in an adult is an unusual manifestation of a pathological condition, worthy of further study (fig. 1).

A review of the literature reveals that xanthoma was first described by Rayer in 1836 and through succeeding years up to and including January, 1934, there are over two hundred references[1, 2]. It is due to a metabolic disturbance that varies in its manifestation from a few golden-yellow plaques in the skin about the eyes, in elderly people, to fatal conditions involving all the structures of the body.

The condition occurs as a primary entity, such as Gaucher's disease, in which the characteristic lesions are found in the liver and spleen, with kerasin in excess in the blood. It occurs in female children and is familial.

Niemann-Pick's disease is racial, found in Jewish infants, and is usually fatal before the fourth year of life. The liver, spleen, lymphatic glands, thyroid gland, epithelial cells of the kidney, ganglion and glial cells of the nervous system are involved; lecithin is in excess in the blood.

Hand's disease (Christian-Schüller's syndrome), neither racial nor familial, is manifested by exophthalmus, diabetes insipidus, and defects in the membranous bones (ethmoids and small wing of the sphenoid).

Wheeler[3] reported a case in 1931, asserting himself to be the first to do a biopsy on the orbital tissue in one of these instances of Christian-Schüller's syndrome.

Xanthoma occurs also in conjunction with diabetes, liver disease, and pregnancy.

The various manifestations are all related and depend on an infiltration of the reticulo-endothelial cell with lipoids, chiefly cholesterol and its esters, existing in excess in the body fluids and that cannot be properly excreted so act as irritants to body tissue.

The basic lesion is a foreign-body granuloma, noninfectious, of slow or rapid development, due to lipoids being deposited in the tissue. If of slow development, nodules result; if of rapid development, the result is a diffuse infiltration.

The granuloma has three essential elements[4]: (a) the foamy lipoid cell, the specific cell that contains the lipoid substance; (b) the inflammatory cellular exudate, the reaction of the tissue to the lipoid material; (c) connective-tissue proliferation.

Its etiology is unknown. It is not considered a deficiency disease but may be due to excess of albumin and lipoid-producing foods. There is no proof that there is a congenital, familial, or acquired familial predisposition to faulty lipoid metabolism.

In the treatment of xanthomatosis, x-ray therapy is beneficial to the areas of lipoid deposits in the bones and causes their disappearance. Practically no change is noted in the exophthalmus[5]. Low-fat diet, arsenic, thyroid and pituitary extract, insulin in the diabetics, and many other lines of treatment have been tried without real success.

Case Report

Mrs. M. L., aged 37 years, married, of Spanish nationality, and speaking no English, was first examined by the

writer in June of 1931, and gave the following history through an interpreter:

About four years ago (1927) she noted a yellowish discoloration of the skin of the right upper eyelid. This yellowish tinge became deeper in color and gradually developed in the other eyelid. One-and-a-half years ago (January, 1930) the eyelids became thickened, six months later (July, 1930) the right eye began to protrude and the left followed at an interval of three months (October, 1930). Recently there was lacrimation of the right eye, with some redness.

The family history is irrelevant. The father is dead, his age at death and the cause are unknown. Mother, living and well, is aged 82 years; one brother and three sisters are alive and well.

Fig. 1 (Rogers). Bilateral exophthalmus in xanthomatosis.

The patient's past personal history is also irrelevant. She was married at 19 years of age, has five children living and well. Two children are dead, one as the result of heart disease and one of diphtheria.

The present personal history begins five months ago (February, 1931), when she gave birth to a normal child. During the course of the pregnancy she developed polyuria and polydipsia, drank on the average of twenty glasses of water a day. She still complains of the same symptoms in association with occasional headache, accompanied by nervousness and mental irritability.

Examination. The eyelids were stained a golden yellow, and were about double the normal thickness. This staining extended about 25 mm. above and below the lid edge and 12 mm. laterally in the right eye. In the left, the staining was 20 mm. above and 15 mm. below, with proportionately a smaller amount laterally. The skin was freely movable over the nodular masses beneath it.

The summit of the right cornea was 37 mm. forward as measured by the exophthalmometer, and diverged 3 mm., with limitation of motion in all directions. The growth causing the proptosis was composed of nodular masses of varying size up to that of a cherry. There was chemosis and protrusion of the conjunctiva at the internal canthus, congestion of the lid and bulbar conjunctiva, with a lagophthalmus of 5 mm. Vision was 10/200; there was mild papilledema of about 2 diopters, with the edema extending about 2 disc widths into the retina. The vessels were very much engorged.

The cornea of the left eye was forward 25 mm., with limitation of motion in all directions, but not as pronounced as on the right. The chemosis and protrusion of the lower-lid conjunctiva was greater in this eye. Vision was 20/35; there were 4 diopters of papilledema, the edema extending 3 disc widths into the retina, with marked tortuosity of the blood vessels. The visual field, taken with a 2-mm. white test object, showed a 30° contraction in the temporal field, extending the same amount to the vertical meridian superiorly and inferiorly. This would sug-

gest pressure disturbance on the nasal side of the nerve.

Tension was within normal limits in each eye (Schiötz).

She was admitted to the Long Island College Hospital for general study and survey.

Her general physical condition was essentially normal, the patient being well oriented, not ill, and well nourished. Heart and lungs were considered normal. The throat showed diseased tonsils, the nose, a moderate rhinitis. There was moderate pyorrhea of the lower incisors. The kidneys, liver, and spleen were not palpable. No masses nor tender areas were found. Extremities disclosed varicose veins from feet to knees, with moderate edema. In the nervous system, no pathology was demonstrated.

The urine (82 ounces excreted in 24 hours) had a specific gravity of 1.000;

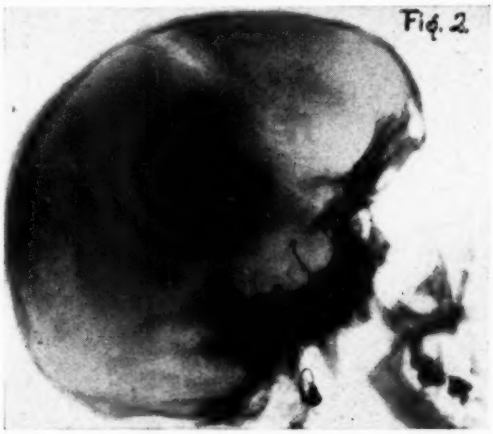


Fig. 2 (Rogers). X-ray film of skull shows enlarged sella turcica and changes in the posterior clinoid process.

was neutral, pale yellow, with no findings except a few epithelial cells.

The blood hemoglobin was 80 percent Sahli; red cells 4,000,000; whites 7,200: the differential analysis showed 67 percent of neutral polymorphonuclear cells; 20 percent of lymphocytes; 3 percent of large mononuclears; no abnormal forms.

The blood chemistry revealed sugar in the amount of 108 mg.; urea 21.4; uric acid .3; creatinin 1.2 mg.; cholesterin (whole blood) 342 mg.; phosphates (whole blood) 4.2 mg.; calcium (serum) 8.5 mg. Repeated blood Wassermann and Kahn tests were negative.

X-ray examinations were made by Dr. A. L. L. Bell (fig. 2); stereoscopic (June 4, 1931) films of the skull in both lateral and postero-anterior positions, show there is no evidence of cranial bone pathology and the orbital regions show no evidence of pathology other than soft-parts shadows on the postero-

Fig. 3 (Rogers). The condition five months later, after intensive x-ray therapy had been applied for four months.

anterior film, which are due to the xanthomatous formation about the eyes. The right antrum is not as well aerated as the left, but this is regarded as of no significance for the xanthoma process. Other paranasal sinuses are well aerated and clearly outlined. The sella turcica is enlarged. The dorsum sellae is delicately constructed and peculiarly shaped. It is perhaps tilted backward slightly. There is rather marked alveolar absorption about the lower molar teeth.

All the bones of the body except those of the hands and feet were x-rayed without any pathology being discovered.

Biopsy (June 30, 1931). After all preparations had been made for a general anesthesia, the patient upon reaching the operating room, balked at having the mask over her face, so that it was necessary to inject novocaine solution, and remove a piece of the eyelid and some of the tumor mass of the orbit under local anesthesia. The material from the orbit was yellowish in color

and looked and felt like a piece of spongy rubber.

Specimen A. Biopsy from the right orbit, examined by Dr. A. DeVeer (fig. 4).

The tissue is an irregularly shaped mass measuring 5 cm. in its greatest diameter, fairly firm in consistence and of a yellowish-grey color.

Microscopically the specimen is composed of granulomatous tissue containing large numbers of so called "foam cells" or "xanthoma cells." These occur in compact pale-staining masses or are irregularly distributed throughout the

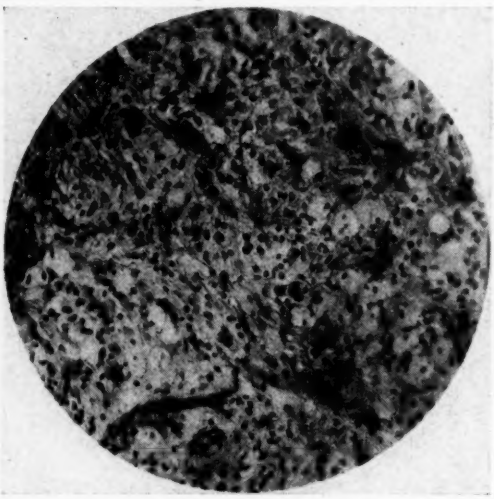


Fig. 4 (Rogers). Section of granulomatous tissue from the orbit showing large numbers of xanthoma or lipoid cells.

tissue. The characteristic feature of these cells is the large cell body, filled with vacuoles which have evidently contained a lipoid material. Foreign-body giant cells are rather numerous and lymphocytes, plasma cells, and occasional polymorphonuclears are found irregularly distributed throughout the tissue. A loose connective-tissue trabeculum is found separating nests of xanthoma cells. The entire structure is only moderately vascular.

Specimen B. Biopsy from eyelid.

This is a small portion of skin which contains a yellowish, firm nodule.

Microscopically the same type of change is found in the chorium, as is seen in the tissue from the orbit. The normal structure of the chorium is replaced by a granulomatous mass in which there are collections of xanthoma cells, foreign-body giant cells, and numerous lymphocytes, plasma cells, and other wandering cells.

Diagnosis—Xanthoma, or lipogranuloma of eyelid and orbit.

Therapy. By a fractional method, intensive x-ray therapy was given from July 1, 1931, and carried on intermittently until October 30, 1931. The dose was 200 kilovolts, with ½ mm. copper filtration up to complete epilation and first-degree dermatitis, over both temporal areas including orbits and pituitary. The size of the area covered was 225 square centimeters (fig. 3).

On her admission to the hospital there was an exposure ulcer of the right cornea, in the lower part. She refused to have the eyelids sewed together to relieve the lagophthalmus of 5 mm., and as a result, in spite of all efforts in the way of treatment, the cornea ruptured in about two weeks, with complete loss of vision.

The vision in the left eye gradually failed, with increase in the amount of papilledema and with the further development of the degree of proptosis.

On October 1, 1931, her ankles were swollen and she was admitted to the hospital with a diagnosis of pericarditis. She remained one day refusing any kind of examination or treatment except an x-ray of her head and chest. The report was "that there was a marked enlargement of the heart to the right and left." A skull film taken at the same time showed no change from the previous examination.

The case was under observation intermittently until July, 1932. At that time, the patient became uncooperative and difficult to handle, and ceased her visits when a blood chemistry and further biopsy were advised.

At our request, the social worker from the Brooklyn Bureau of Charities persuaded her to return a year later.

X-ray films taken on June 1 and 29, 1933, showed absolutely no change whatever in the skull findings when compared with those of June, 1931.

A photograph (fig. 5) shows the re-

markable regrowth of hair and the subsidence of the inflammatory reaction of the eyelids present when the x-ray treatments were being given. Outside of a slight fading out of the yellow color of the eyelids, the clinical picture shows a slow but gradual increase in the thickening of the eyelids and progress in the proptosis, along with the loss of vision in both eyes.

of the brain, involving the third ventricle (tuber cinereum and infundibulum), or possibly the posterior lobe of the hypophysis, is the usually accepted explanation, and that there was disturbance in this area in this case may be accepted from the x-ray findings and the growth of new hair. The only abnormal finding in the blood examination was the increase of cholesterin

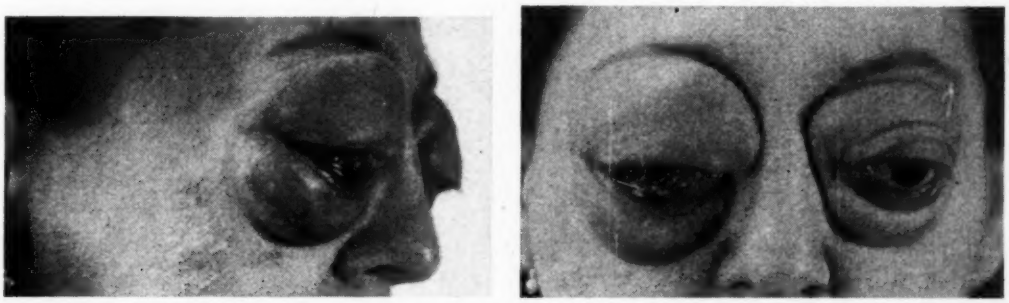


Fig. 5 (Rogers). Showing regrowth of hair and the subsidence of the inflammatory reaction of the eyelids to x-ray therapy. Progress of proptosis is evident. Entire loss of vision in both eyes.

Summary

The case presented is of the primary type of lipogranuloma, with deposits in the orbital tissue and eyelids, the diagnosis from biopsy specimen being one of the few reported to date. The x-ray findings were negative for changes in the skull and long bones except those noted in the sella turcica. That diabetes insipidus is due to pressure at the base which accounts for the deposition of lipoids.

In conclusion I wish to thank Dr. M. J. Leitner, who acted as interpreter, Dr. A. L. L. Bell, and Dr. A. DeVeer for their cooperation in the Departments of Radiology and Pathology, respectively.

680 Saint John's Place.

References

[1] Knapp, A. Xanthomatosis of the orbit. Arch. of Ophth., 1934, Jan., p. 141.
[2] Wheeler, J. W. Schüller-Christian disease. Arch. of Ophth., 1934, Jan., p. 214.
[3] Wheeler, J. W. Exophthalmus associated with diabetes insipidus, etc. Arch. of Ophth., 1931, Feb., p. 161.
[4] Chester, and Kugal. Lipoid granulomatosis. Arch. of Path., 1932, v. 14, pp. 596-7.
[5] Sosman, M. C. Xanthomatosis. Jour. Amer. Med. Assoc., 1932, Jan. 9, p. 116.

MALNUTRITION IN RELATION TO ULCERATION OF THE CORNEA IN GONORRHEAL OPHTHALMIA NEONATORUM

CHARLES E. WALKER, JR., M.D.
BOSTON

A statistical review of one hundred and forty infants with ophthalmia neonatorum of gonorrheal origin was prepared from the records of the Massachusetts Eye and Ear Infirmary. The nutrition of the group developing corneal ulcers was compared with that of those in whom no corneal involvement was noted. It was found that nutrition had influenced ulcer formation in the series studied.

No mention has been made in textbooks of ophthalmology nor in the literature since 1920 of general health or gain of weight in connection with gonorrheal ophthalmia neonatorum. All cases of corneal ulcer in infants treated during 1923-1933 inclusive and a series of 100 consecutive cases (1927-1928) with smears positive for gonococci have been reviewed in the records of the Massachusetts Eye and Ear Infirmary with regard to health, weight, prematurity, and gastro-intestinal disturbances.

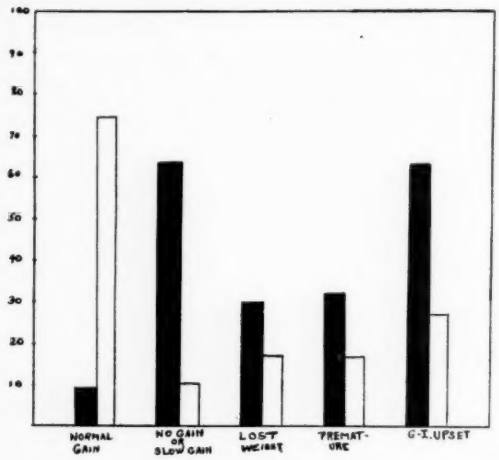


Fig. 1 (Walker). In the above graph, the black rectangles represent the percent of ulcer cases and the white rectangles represent the percent of cases without ulcer.

This review was prompted by four cases of ulcer recently observed. Each was associated with gastro-intestinal disturbance and loss of weight throughout the acute stage of the ulcer, and one of the four infants was premature.

Much of the desired information was not present in the records. In the case of patients admitted with corneal ulcer, regardless of the duration prior to admission, if loss of weight and diarrhea were not noted the development was considered normal.

Of the total number of 45 infants with ulcer, 13, or 28.9 percent, lost weight during the acute stage of the ulcer; 12, or 26.9 percent, failed to gain weight during the acute stage; 16, or 35.5 percent, gained but slowly; and only four, or 8.9 percent, gained normally. Fourteen, or 31 percent, were premature. In 35 cases, ulcers were present at the time of admission, and in 10 cases they developed after admission.

In the 100 consecutive cases studied in which there were positive smears but no ulcers, 74 infants were normal in their weight curve; 10 were slow to gain; 16 lost weight; and 16 were premature. There is a probability that the infant who does not gain in weight is unable to assimilate his food properly and is thus unable to utilize essential vitamines. The accompanying figure is an attempt to compare these percentages graphically.

Several interesting points were noted in reviewing the records. No seasonal variation was apparent, nor was sex a factor. Some children had as many as nine feeding formulae presented before they began to gain in weight. Gastro-intestinal disturbances were noted in 28, or in 62 percent of the 43 with ulcer, and in 26 of the 100 without; that is, the ratio is more than 2 to 1. As regards their general condition, all infants in the Eye and Ear Infirmary are under the care of the pediatrics department at the Massachusetts General Hospital.

Conclusions

Although it is unwise to infer too much from a review of this sort, the following conclusions are indicated:

(1) Aside from the accepted local treatment, careful attention should be directed toward the dietary regulation of patients with ophthalmia neonatorum.

(2) Premature infants seem to be more susceptible to corneal ulcers than full-term babies.

(3) Gain in weight seems to be inversely proportioned to corneal involvement and progress in the infant.

243 Charles Street.

THE TESTING OF VISUAL ACUITY

III. Types of test field and a projection apparatus

C. E. Ferree, Ph.D. and G. Rand, Ph.D.
BALTIMORE

Three ways of securing the test field in making the examination for acuity are discussed:—the illumination of test characters printed on an opaque surface; the transillumination of test characters printed or otherwise impressed on a translucent surface; and the projection of the test field from a lantern slide. The conditions which should be satisfied in each of these ways are stated and the merits of the fields obtained are compared. A projection apparatus by means of which all the principles recommended in this and the previous papers of the series may be applied, is referred to and its features and advantages are briefly noted. From the Research Laboratory of Physiological Optics, Wilmer Ophthalmological Institute, Johns Hopkins Medical School.

In making the examination for acuity, three ways of securing the test field have been employed. The method most commonly used is to print the test characters on an opaque surface and to illuminate this surface from one or more sources suitably positioned in front of the plane in which the surface is located. The background and test objects are thus seen by reflected light. When properly done, this method of securing a test field gives excellent results; i.e., the physical factors that cause an unclear image may be reduced to a minimum. The following requirements, however, should be satisfied:

(1) The test surface should be mat; i.e., it should give diffuse, not specular, reflection, or at least a very low percentage of specular reflection. In diffuse reflection the light diverges from each point in the surface as if it were in itself a point of light. When this light is brought to a focus by the refracting system of the eye, an image of the point is formed. In specular reflection the surface acts merely as a mirror to change the direction of the beam of light in accordance with the well-known law; the angle of reflection is equal to the angle of incidence. That is, the reflecting surface does not become optically a secondary source of light. When light specularly reflected is focused, an image of the primary source is formed, not of the reflecting surface or secondary source. When both are combined, as is the case in reflection from glazed or sized paper, the eye, in order to see the reflecting surface and the objects printed thereon, adjusts its focus for the light which is diffusely reflected, for that alone gives an image of the surface. The specularly reflected light forms over the image an overlay of glaring unfocused light which blurs its outline and serves greatly to confuse vision. A great deal too much specular reflection is given by the test charts made and distributed to practitioners in America.

(2) The light incident on the test surface should be well diffused. It is obvious from the above statement of principles that the maximum amount of specular reflection would result from a directed beam of light, and the minimum from highly diffused light. The evil effects of too much gloss or glaze on the test surface may be greatly reduced by illuminating it with light well diffused.

(3) The light should be evenly distributed over the test surface; i.e., each test object printed on it should receive the same amount of light. Otherwise they will not be equally visible and will not have their rightful place in the scale.

A second method is to print, or otherwise impress, the test characters on a translucent surface which is illumi-

nated by light coming from behind. This method of lighting the test field, which is called transillumination, is open to serious objection. Transillumination is a very poor method of illuminating the test surface. In order to get a clear image of the test surface, it alone must diffuse the light coming to the eye. The test surface in the screens that are transilluminated is the front surface of the plate of glassware or other translucent medium that is used. When these screens are illuminated from behind, the eye receives light diffused not only by the front surface but light scattered and diffused at every point throughout the entire depth of the plate or medium and, depending upon the density of the medium, perhaps some directly from the source itself. The refracting system of the eye can scarcely be expected to focus for all these distances in one act. The result is an image blurred and rendered unclear by an overlay of scattered and partially focused light. It is this diffusion and scattering of light at different depths in the medium that give the appearance of translucency. The diffusion of the light from the front surface alone gives the appearance of opacity. The appearance of opacity is needed to give a clear delineation of the test object. In testing the eye, whether for the detection and correction of its refractive defects or for the purpose of making a comparative rating of the eye, no factor in the test conditions leading to defective imagery can be tolerated if good results are to be obtained.

A third method is to project the test characters from a lantern slide on a reflecting surface. Little use has as yet been made of this method as a means of obtaining the test field. It has, however, many advantages as to merit and convenience and feasibility of working. Among these advantages the following may be noted:

(1) The test field is seen by reflected light. If care is taken that clear images are formed by the projection system, as good a test field may be secured as is obtained by printing the test objects on a surface and viewing them by reflected light.

(2) Great latitude is possible in the selection of the test surface. The test characters may be projected on white, on any shade of gray, or on any type, texture, or character of reflecting surface that may be desired. Such latitude and variety are not possible in test charts. Test charts are usually printed on white card, the surface of which is so highly glazed as to be optically unfit for the purpose of testing.

(3) The projection method makes easily possible a great variety of sizes of test object. This may be accomplished in two ways: (a) In the making of lantern slides any number of sizes can be easily secured by photographic magnifications and reductions. This range of opportunity in the use of printed charts is not so readily available to the individual practitioner or examiner. (b) The projection system of the apparatus may be so designed that the changes in size may be produced in continuous series at the will of the examiner in the process of projecting. In the use of the projection method, both this and the above means of changing size may be used singly and in combination. The advantage secured is of inestimable value.

(4) The projection apparatus also may be designed so that changes in the illumination of the projected field may be varied in continuous series without change in the color and composition of the light. In combination with (3) we have thus a means of changing the size of object in continuous series without changing the intensity of illumination or of changing the intensity of illumination without changing the size of the test object. Further, as stated in (2), the images of the test objects may be projected on a background having any coefficient of reflection that may be desired. There is thus placed at the command of the examiner the possibility of easily varying at will, either in combination or in separation, the three cardinal factors in the visibility of the object; namely, its size, its relation to the background, and the intensity of its illumination. The projection apparatus may also be designed so that the test object may be rotated through 360 degrees, thus providing for an objective check on the judgment and for testing

the resolving power of the refracting system in any plane or meridian that may be desired.

(5) A further very distinct advantage afforded by the projection method is the great diversity of test material in a compact form which it renders possible. A small box of lantern slides may be made to provide full-sized charts of any range and variety of sizes of test object, single test objects of different types and sizes, special tests for astigmatism, etc. It is the one method, for example, which makes feasible for routine examination the very sensitive test for astigmatism which we described some years ago; namely, the broken circle used in connection with the illumination scale. Finally, the projection method presents great advantages in convenience of operation. All of the controls are on the projection apparatus itself, and both the patient and the apparatus are within convenient reach of the examiner. The annoyance of walking back and forth from patient to test chart and the expense and insecurity of equipment for distant control are eliminated. Also, lantern slides are less expensive than good test charts and are easier to store, to care for, and to keep clean.

A Projection Apparatus for Testing Acuity

A projection apparatus has been developed by us which provides for all conditions and controls which we believe sustain an important relation to the testing of acuity. The apparatus in an earlier and much less improved form was described in 1926[1]. Mention of it is made here only in so far as is needed to indicate its relation to the points discussed in this and the preceding papers of the series and to show the feasibility of the principles recommended.

In principle, the apparatus is a projectoscope with a provision for changing the distance of the slide from the projecting system and a compensating provision for changing the strength of the projecting system so that the image is always focused at the same distance. Change in size of the images thus occurs in direct proportion to the change in distance of the slide from the projection system. Unlike other projectoscopes which have this feature, however, the means of changing the focus does not change the intensity of light in the projected field. In this respect the instrument is like the eye. In case of the eye with a constant size of pupil, a change in the distance of the object from the eye while it changes the amount of light incident on the pupil does not change the light in the image. This is due to the fact that, with change in the intensity of light received from the object, there is a compensating change in the size of the image which keeps the intensity or density of light constant. Both intensity of light received and size of image follow the same law of change; namely, both decrease as the square of the distance.

The following are some of the more important features and advantages of the instrument:

(1) The size of the projected test object may be changed in very minute or large steps at the will of the operator, without change in the intensity or density of light in the image.

(2) Changes of intensity of light can be made in continuous series from zero over a very wide range without changing the size of the object or the color and composition of the light. Change in composition of light as already pointed out, introduces variable errors in the formation of the image, due to chromatic and diffractive aberrations which are confusing and detrimental to the purpose of the test, and leads besides to false corrections of hyperopia and myopia, which are by no means unimportant in the correction of hyperopic and myopic astigmatisms.

(3) The instrument can be made with less expense, if the provision in the projection system for changes in size of test object is excluded. The omission of this provision is not of serious consequence for the use of the instrument for refractive purposes. Two reasons may be given for this: (a) It is quite feasible and easy to provide for an ade-

[1] Ferree, C. E., and Rand, G. An acuity apparatus with attachments for testing the light and color sense and for color mixing. Arch. of Ophth., 1926, v. 55, pp. 245-256.

quate number of sizes by lantern slides. Moreover, the examiner can easily have made by photographic magnifications and reductions just what sizes he wishes to use. He has not this latitude, for example, when he seeks to procure printed charts. (b) With the means for varying the intensity of illumination provided, infinitesimal steps of discriminative difficulty can be inserted, if desired, between any two sizes of test object or lines on the chart. The provision in the projection system for changes of size of test object is of importance primarily for the rating of vision, also in cases requiring more elaborate specifications than are needed in the work of selecting the correcting glass.

(4) Any type of acuity chart or test object, special astigmatism object or chart, etc., which can be represented in a lantern slide can be conveniently prepared and used with the instrument. Thus, in this the examiner is not limited to the inadequate and inferior charts and devices which are commonly supplied to the profession. With the aid of the nearest photographer he can add to his equipment what he chooses. The ability to do this should not only greatly improve the grade of work that is done in daily practice but would, we believe, arouse and stimulate an interest in the study of the principles of testing and in the devising of new and better tests. There is nothing quite so stultifying to advancement as to be limited in one's opportunities by what this or that firm chooses for commercial reasons to place upon the market. This, in our opinion, is one of the most outstanding handicaps to advancement in many phases of the practice of medicine. A research laboratory, for example, is hopeless without a well-equipped shop; likewise, the chance to contrive and devise to meet individual interests and needs is required for alert and progressive work in the office and clinic. Individual differences are so great among patients that the diagnosis of the greater number presents in important measure the elements of a research problem, and in many cases a very complicated and abstruse research problem. It is too much to expect that a satisfactory solution of these problems can be made with an equipment that is not only stereotyped but commercially selected.

(5) A provision is made for the rotation of the test into any position within 360 degrees. This is of great advantage in affording an objective check on the judgment and in making it possible to select and test the resolving power of the refracting system in any plane or meridian that is desired. Not only can single test objects be rotated, but a group of them may be so arranged on a slide that the entire group can be rotated to advantage. To be able to rotate the test object is almost an indispensable requirement in the testing for astigmatism, particularly when the test is made by the acuity method.

(6) Every change, variation, or control that is needed can be made at the projectoscope itself, within easy reaching distance of the patient. If the examiner is compelled to walk back and forth from patient to chart or test cabinet, a great deal of time is lost, the result of which is a limitation to an unduly simple and inadequate procedure in order to save time and effort. The attempt at distance control has ever proved unreliable and unstable, unsatisfactory and prohibitively expensive. In the case of the present instrument, an inexpensive projectoscope and a small box of slides constitute the entire equipment; it occupies but small space and, when not in use, can be stored in any part of the room that is convenient. It is not only compact, portable, and easily cared for, but there is nothing about it that is unduly complicated, perishable, or liable to getting out of order. Without the slides, the instrument may also be made to serve a useful purpose in illuminating printed acuity and astigmatism charts, when desired, and all other test surfaces for which evenness of illumination and a variable change of intensity without change in color and composition of light are important requirements. The instrument, we are glad to say, will soon be made available for general use.

The Wilmer Ophthalmological Institute.

NOTES, CASES, INSTRUMENTS

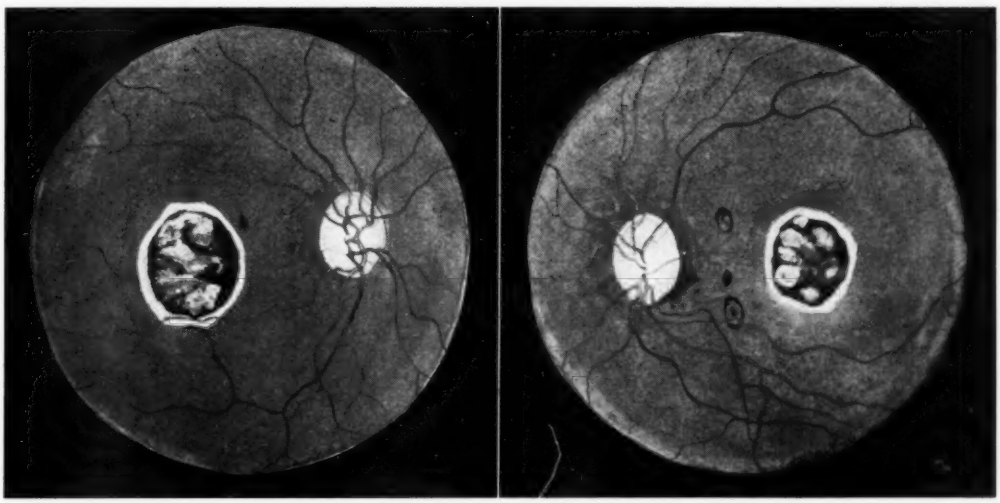
BILATERAL MACULAR COLOBOMA (CASE REPORT)*

AARON BRAV, M.D.
PHILADELPHIA

Bilateral macular coloboma is a rare congenital ocular condition. About fifty cases have been reported in the literature, collected chiefly by Beck, in 1893. The cases are not easily diagnosed, as they closely resemble various macular degenerations. Many cases of macular degenerations have been reported under the heading of macular disciformis, or disc-like degenerations of the macula, by Kuhnt. Holloway reported a series of eight such cases. Hansell described a nearly circular bilateral symmetrical defect of the macula in which case the remainder of the fundus was normal, but this was associated with a moderate degree of squint and marked horizontal nystagmus.

About seventy-five percent of the patients reported were myopic. It is generally known that these cases are vulnerable to slow inflammatory processes, so that it is sometimes impossible to state definitely whether the changes are postnatal or prenatal in origin.

The case I present is that of a girl, thirteen years of age. The patient is much below par physically, having the appearance of a child of eight years; mentally, however, she appears normal and she is in the eighth grade in school, and makes good marks. The girl is the sixth of a family of eight children. I examined four of them, and found them free from any congenital defect. The parents are free from syphilitic taint.



Figs. 1 and 2 (Brav). Bilateral macular colobomata.

Externally, the eyes show a considerable lateral nystagmus, and the left eye deviates outward. The pupils are normal, and react well. The vision without glasses is 6/60 in each eye; with glasses 6/15.

The eye grounds present well defined optic discs with temporal atrophy in each eye. There are several massive choroidal pigment spots adjacent to the macular defect. In the macular region, there is a clearly defined area of partial absence of both retina and choroid (certainly an absence of pigment layer) about three disc diameters in size in the right eye, and somewhat less in the left eye. The edges of these areas are definitely outlined by a heavy rim of cho-

* Read before the Ophthalmological Section of the Philadelphia County Medical Society, May 8, 1934.

roidal pigment resembling the choroidal ring around the disc. This again is circumscribed by a heavy white or scleral ring. Within the circular areas there are some fine fibers, and a network of choroidal pigmentation (the remains of the choroid). The surface is depressed, as measured by the degree of myopia when compared to the adjacent retina. The choroidal vessels are seen within the defective zone and the temporal retinal artery travels along the inner margin of the choroidal ring.

Taking into consideration the entire clinical picture and comparing it with the various cases reported as macular degenerations, I have come to the conclusion that this is a case of bilateral coloboma of the macula.

2027 Spruce Street.

SOCIETY PROCEEDINGS

Edited by Dr. H. Rommel Hildreth

COLORADO OPHTHALMOLOGICAL SOCIETY

February 17, 1934

Dr. W. M. Bane presiding

Lacerating wound of the conjunctiva and sclera; rupture of the choroid

Dr. William C. Bane presented the case of C.P., aged 34 years, a blacksmith's helper, who on February 8, 1934, was struck in the left eye while working with a sledge hammer. Very little sensation from the blow was experienced, but the vision soon became very dim. The next day vision O.D. was 20/60 and vision O.S. 2/240. There was moderate congestion of the globe, not circumcorneal; the pupil was oval and drawn downward and there was 2 mm. of blood in the lower anterior chamber. There was an oval opaque deposit about 3 mm. in diameter on the anterior lens capsule. There was a horizontal, slightly curved cut, slanting downward 8 mm. in length into the conjunctiva and sclera, located 6 mm. below the cornea and exposing the choroid. The vitreous was quite hazy, preventing a clear view of the fundus. The macula was not clear, and there was possibly slight edema of the retina. One half disc diameter downward and outward from the disc there was a gray area of irregular oval shape about one third disc diameter in width and a disc diameter in length. The tension was below 15 mm. The x-rays were negative. The conjunctival wound was sutured.

One week later the vision of the injured eye was 2/80. A small posterior polar cataract was noticed in each lens. The vitreous gradually cleared so that on March 10th there was seen a slightly curved linear rupture of the choroid commencing one half disc diameter to the nasal side of the disc extending downward and outward terminating in the previously noted gray area. Above the lower end of the rupture there was a small island of pigment deposit, a part of the pathological change that was taking place. The vision was 5/60, but faded. The globe was free from congestion; there was a linear scar at the site of the scleral rupture. Dr. Bane referred to Dr. Hanford McKee's articles in the American Journal of Ophthalmology for 1933 regarding similar cases.

Discussion. Dr. Melville Black said that one could not be sure that a foreign body had entered the eye. The retinal edema was due to trauma and it would gradually resolve.

Dr. Frank Spencer suggested that there might be a small piece of steel in the eye not found by the x-ray. He cited one case in which a foreign body in the vitreous had been found with the ophthalmoscope and missed by the x-ray.

Dr. Edward Jackson said that no radiogram of an injured eye was complete without shorter exposure with a softer tube which would show up small foreign bodies otherwise overlooked. All the symptoms, however, pointed to a larger foreign body in this eye, probably larger than the 6 to 8 mm. wound. All the symptoms could be caused by a bruise of the eyeball. It was possible that the projecting edge of a large foreign body cut the track in the sclera and bruised the eye.

Bilateral ectopia pupillae and lentis

Dr. R. W. Danielson presented the case of Donald R., aged 6 years. His parents had noticed that his eyes had always looked queer and that he did not see well. The vision in each eye with +11.00 sph. was 4/30. There was some nystagmus which was worse without the glasses. The pupils were small and displaced close to the limbus toward "2:00 o'clock" in the right eye and "10:00 in the left." There was a partial pupillary membrane in each eye. No fundus pathology was noted. The child was in a sight-saving class. Dr. Danielson asked if surgery was indicated

either to enlarge the pupil or to remove the lens or both.

Discussion. Dr. Melville Black asked if there was a coloboma of the choroid. He advised against surgery.

Dr. Frank Spencer said that operative procedure might make a bad matter worse.

Dr. Edward Jackson was of the opinion that nothing was to be gained by enlarging the pupil. Lenses should be prescribed to give as much vision as possible.

Familial macular degeneration without cerebral changes

Dr. R. W. Danielson presented the case of Harry H. and his sister, Ethel. Harry, aged 27 years, gave the history of blurred vision in both eyes beginning at about 10 years of age, which the parents believed to be due to a fall at the age of 7 years. At the age of 11 he was seen by the late Dr. Harold Gifford who noted in part, "the macular region shows numerous light spots in the retina over an area of 4 to 5 discs in diameter. These spots are about pin head in size with connecting lines of degeneration; some of these overlie the vessels. These spots look in indirect image as if there were displacement of pigment. The affected area reaches from the temporal side of the nerve to the outer periphery, but not at the nasal side of the discs. The nerves are atrophic in the outer half. It was later found that these white spots show much better with bright wire and when this is used practically no displaced pigment is noted in the right eye, but there is somewhat more in the left. With a frosted glass all pigment in the affected area is seen to be slightly irregular and displaced." (These notes were kindly furnished by Dr. J. H. Judd.)

No relatives were affected except one sister (Ethel) in a family of four brothers and two sisters. Physical examination was negative. The blood Wassermann and Eagle flocculation tests were negative. The vision of each eye was fingers at 1.5 meters. The pupils were partly dilated and reacted very sluggishly to light and accommodation. There was some divergence and no central fixation. The media were clear. The fundus change was not a distinct macular circumscribed lesion, but rather a diffuse patchy pigmentary disturbance, more marked at the macula and extending irregularly, in some areas almost to the temporal periphery. The nasal retina was practically normal. In many areas the pigment was near the veins and resembled in appearance retinitis pigmentosa. The visual fields taken by eccentric fixation with a 2 cm. test object at 33 cm. distance showed only moderate peripheral contraction with an irregular central scotoma to about 20° in each eye. In the remaining ring of field red, green, and blue were poorly seen in the right eye, but quite well in the left eye. The eyes were practically emmetropic. Other interesting features in this case were, that the patient was able to make his own living working in C.C.C. Camps and in a sugar factory, and had been driving a car for the past fourteen years at high speeds with only one accident. There was no mental degeneration.

The sister, Ethel S., aged 38 years, married, had had poor vision since the age of 8 years, which she believed to be due to a fall in infancy. The past history was irrelevant except for one miscarriage and sterility since that time. There was a slight secondary anemia, but no luetic signs. The blood Wassermann and Eagle tests were four plus. There was no mental degeneration. This patient had also been seen by Dr. Harold Gifford in 1918, who at that time found the vision to be right eye 4/200, left eye 8/200. The patient could see best eccentrically. Dr. Gifford found the discs to be slightly atrophic in the outer quadrants. In the macular region there was slight irregular pigmentation with a fine gray or light opacity in the anterior layers of the retina. These gray appearances were somewhat streaky in irregular areas and appeared to be below the retinal vessels. It was evidently not exudate, but a degeneration of the retina which extended over an area four discs breadth in diameter up and down, and reaching well out to the periphery on the temporal side where a small spot of atrophy was seen. This peripheral patch was more marked in the right eye. At present the vision of

the right eye was light projection in some areas and the vision in the left eye was fingers at two meters. The pupils were partially dilated and reacted very poorly to light and accommodation. The eyes were divergent and there was no central fixation. There were posterior capsular lens opacities in both eyes, and a few vitreous floaters. The nerve heads were pale and the arteries were small. There was retinal degeneration in the macular region and beyond, but not in the nasal quadrant. The visual fields showed central scotomata which had broken through the upper nasal quadrants of both fields so that there was vision only in the lower temporal and lower quadrants of each eye with a 40/330 mm. white object; red, green, and blue were seen in this area in the right eye, but not in the left.

Dr. Danielson said that the fundus pathology in both cases was not definitely pathognomonic and could be due to other causes; the diagnosis was made on the history of early onset and the familial characteristics. The character of both cases followed closely Stargardt's description of juvenile macular degeneration without mental deterioration. There was a tendency too for the condition to occur at about a given age and a given family. Both of these cases began at about eight years of age. Usually in cases beginning before the age of ten years there was accompanying mental deterioration. Dr. Danielson asked if there were any contraindications to the use of arsenic for the treatment of lues in the case of the sister.

Glaucoma following cataract extraction

Dr. W. M. Bane reported a case of hypertension and iris bombé following cataract extraction. The patient was operated on (cataract extraction, right eye) several years ago. The right eye was now blind. Five months ago the patient had a cataract removed from the left eye. There was postoperative inflammation and the vision was now greatly diminished. There was an iris bombé and the tension was 66 mm. A transfixion was done following which the iris remained flat for two days and the tension was reduced. At the present time the tension was 66 mm. again and some operative procedure would be necessary to reduce the tension. He intended to do a trephining or iridencleesis.

George H. Stine,
Recorder.

CHICAGO OPHTHALMOLOGICAL SOCIETY

April 16, 1934

Dr. Dwight C. Orcutt, president

Xanthomatosis bulbi

Dr. Robert von der Heydt said that this condition was a disturbance in the lipoid metabolism, the relationship of the various fat groups to one another as well as that of free and combined cholesterin. Szily in 1923 first described an orange-colored infiltration of the iris and anterior eyeball. Since then case reports had been given by Wagenmann, Gifford, Meesmann, Engelking and others. Engelking believed that the tissue change was derived from a circulation rich in fats, plus the local factor of a metabolic alteration in the developing granulation tissue. Numerous cases of incipience of this ocular condition had been reported, which presented cholesterin crystals in the aqueous, and he had seen several cases where these iridescent crystals were not hematogenous in origin, but derived from a Morgagnian cataract in which the capsule had ruptured. These presented a beautiful and characteristic slitlamp picture. In his own case there were no cholesterin crystals visible. This was an example of xanthomatosis bulbi in its final stage.

Miss E. D., 19 years of age, was struck in the right eye by a doorknob eleven years ago. She saw little afterward, had intermittent inflammations, and four years ago the eye looked as it appeared today. There was no light perception. The cornea was practically normal and transparent. The anterior chamber was filled by a yellowish-orange, opaque, vascularized mass. The eye was painful at times, and enucleation was advised for cosmetic reasons.

Discussion. Dr. Dewey Katz said that because of his interest in dystro-

phia adiposa corneae he desired to emphasize that there was no causal relationship between this disease process and xanthomatosis bulbi. In xanthomatosis bulbi the cholesterin crystals were the result of a degenerative process of the blood, of the inflammatory products, or both, which were brought forth by the original injury to the eyeball. Dystrophia adiposa corneae was, in his opinion, brought about primarily by the inability of the corneal cells to metabolize properly the fats brought to them. Although it had been reported that some of the patients with dystrophia adiposa corneae had had increased blood cholesterin, he did not believe that this was the prime factor in the production of the corneal disease.

Siderosis bulbi

Dr. Samuel Wolf presented a 17-year-old boy who gave a history that two years ago he was struck on the nasal side of the left eye while hammering on steel. The eye was red for a few days. His family physician gave him some medicine which brought about improvement. For two years there had been no difficulty until a few weeks ago, when he noticed dimness of vision; this progressed until last week when vision was found to be reduced to hand movements. The right eye was normal.

The left cornea was normal. The iris was discolored, being three shades darker than its mate. The pupil reacted normally to light and accommodation. The lens was completely opaque. Slit-lamp examination showed typical rusty-brown deposits on the anterior surface of the lens. X-ray disclosed a foreign body in the anteroposterior view as well as the lateral view, possibly within the lens itself. A localizing picture had not been made as yet.

Discussion. Dr. O. B. Nugent advised removal of the lens in any manner preferred, with extraction of the foreign body through the pupil. He mentioned several cases, one of which had had a foreign body in the eye for fifty-two years. The lens was extracted and the foreign body removed, with resultant vision of 20/25.

A modified recession operation for strabismus

Dr. Frederick Allison Davis presented a paper on this subject which will be published in this Journal.

Discussion. Dr. M. L. Folk asked if in Dr. Davis' experience the suture had ever pulled out in the Reese resection operation, inasmuch as the stitch was put into the muscle fiber. In the Lancaster operation the muscle was sutured over the stump of the tendon, but when the edge of a cut muscle was sutured to the edge of the stump, he wondered how long it would hold, especially if a recession or partial tenotomy of the antagonist was not done.

Dr. Frederick A. Davis (closing) said that he could not recall having had a main central suture pull out. This suture was introduced with a double armed needle and was of heavy twisted silk. It was introduced from underneath the muscle and from within outward, and was firmly attached to the stump.

Pressure on optic nerve by carcinoma of maxillary sinus extending into the cranial cavity

Dr. Isadore Finkelman and Dr. Samuel Wick read a paper on this subject.

A practical routine for orthoptic training in strabismus

Dr. George Guibor read a paper on this subject.

Robert von der Heydt.

THE OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM

Annual Congress

April 12, 13, 14, 1934

Dr. M. S. Mayou, president

The surgical treatment of the more unusual forms of squint and heterophoria, with especial reference to end-results

Mr. M. S. Mayou reviewed the cases from a series of 700 operations. The operation used by the speaker was the old method of tenectomy by the open op-

eration with advancement. In doing either tenotomy or tenectomy the tendons of the muscles were not separated from Tenon's capsule, as the capsule gave a firm hold for the sutures, and the latter were then less liable to cut out. The stitch material should be soft and easy to pull through: the speaker therefore used Japanese fishing gut which had previously been boiled half an hour.

With regard to partial tenotomy, the speaker's experience was that unless there was complete division of the tendon there was practically no effect; the smallest tag of tendon left undivided being sufficient to prevent the desired result. In performing tenectomy the three-stitch method was used. When it was hoped to increase the effect of the advancement the sutures should be placed further back through the capsule and tendon. Opposing muscles should always be tenotomised, partly for the purpose of increasing the effect, but in any case temporarily to weaken the muscle, so as to prevent traction on the sutures. A complete rest of the muscles should be ensured by bandaging both eyes for the seven days immediately following the operation.

With regard to hyperphoria, operative treatment for this was not often undertaken in England. In anything up to ten degrees of hyperphoria the images could usually be brought together and the symptoms relieved by the use of prisms. Cases of hyperphoria of greater degree frequently showed no attempt at binocular vision. But in cases where the prism did not relieve the symptoms, or in cases where there was binocular vision, especially those associated with ocular torticollis, operation was justifiable. Cases of ocular torticollis with hyperphoria were eminently suitable for operative interference. When corrected, stereoscopic vision resulted immediately, and the head was brought into its normal erect position.

In acute stages of encephalitis lethargica paralytic diplopia was not uncommon, but it was very uncommon in the chronic stages, in which there was a form of diplopia due to a weak convergence or concomitant external strabismus. The divergent strabismus in these cases was not, as a rule, worth operating upon, as, in most instances the mental condition of the patient, or the length of life to him scarcely made it worth while to do anything surgical. Diplopia associated with a syphilitic lesion of the central nervous system was usually due to a paralytic lesion of the ocular muscles, but it was found that in these cases one was usually dealing with a concomitant divergence.

Congential defects of the external recti might occur as unilateral or as bilateral conditions, and were usually associated with convergence, though in some cases the latter might be absent. The bilateral cases were certainly congenital, and most of the unilateral cases also, though in some birth injury had been suspected. They might be associated with other congenital deformities. These were in two groups, one associated with enopthalmos in which the internal muscles and check ligaments seemed to be bound down on the inner side of the orbit, and the other in which there was no enophthalmos. None of the cases operated upon showed enophthalmos. It was important to operate on these cases early in life, otherwise as a result of the operation diplopia occurred.

Discussion. Mr. W. H. McMullen said that the cases of strabismus to which he had given most consideration were those associated with torticollis, and it was to that subject he would devote his remarks. In most forms of congenital paretic strabismus the best results were obtained by tenotomy or recession of the chief opponent to the affected muscle, with, in some cases, advancement of the weak muscle. In cases in which the oblique muscles were concerned it was impossible to alter the positions of attachment of the tendons to the globe. For paresis of the superior oblique, three methods of operation deserved consideration: (A) division of the inferior oblique of the same side, close to its origin. Doyne, in 1926, reported two cases of ocular torticollis in which he had performed this operation. In one of the cases marked improvement resulted, but in the other, little or

none. Temple Smith recommended not merely division of the muscle, but actual excision of a portion of it. From this Smith claimed to have had excellent results in cases of torticollis. The speaker had never attempted this operation, chiefly because of the impracticability of controlling the result. (B) Displacement of the insertion of the tendon of the superior rectus of the same side. In 1903 Jackson described an operation for outward and backward displacement of the insertion, so as to increase the power of intorsion while lessening the power of the superduction. (C) Tenotomy with recession of the inferior rectus of the opposite side. The plane of action of the inferior rectus of one eye lay at an angle of about twenty-three degrees with that of the superior oblique of the other eye, so that they were nearly parallel in action: and the setting back of the tendon of the inferior rectus should compensate for weakness of the superior oblique on the other side.

Mr. P. G. Doyne spoke only briefly of ocular torticollis. He agreed that slight cases of this were not uncommon, and he thought that no treatment should be precipitately attempted. He had encountered a few cases in which the deformity was so marked that secondary postural deformities arose, and in those cases it was necessary to do something. In such cases, in his hands, tenotomy of the inferior oblique had been done, and on the whole was satisfactory. He felt that it was necessary that these cases should be more generally recognized outside the ophthalmic circles, so that proper control could be given them from the beginning.

Mr. Lewis Savin, detailing eight unusual cases of the condition, said that in all these the following conditions were fulfilled before he operated: (1) the diplopia was so troublesome that the patient found it essential to keep one eye covered; (2) diplopia had persisted for a long time without improvement; (3) all cases were examined by a neurologist who advised that no further improvement was to be expected, and recommended operation; (4) the patient was told that the operation was palliative, not curative. The results showed that patients with diplopia were very grateful for even minor relief. The ability to get single vision by ocular torticollis was favorable indication for operation.

Retinal abiotrophy

Mr. A. Sorsby said that the term "abiotrophy" was introduced in 1902 by Sir William Gowers in an attempt to gain a deeper insight into such disorders as could not be explained as results of infection, and that authority stressed the inherent low viability of certain cells or systems. Mott had already, in 1900, written of premature pathological processes of decay attacking groups or systems of neurons subserving special functions whereby functional equilibrium was destroyed. The late Mr. Treacher Collins had worked out the implication in reference to opthalmology, and in a particular paper he dealt with retinitis pigmentosa, arguing that it must be regarded not as the result of choroidal sclerosis, but an abiotrophy of the rods and cones, with secondary involvement of the pigment epithelium.

Discussion. Sir John Parsons objected to the term "abiotrophy" as it was, he considered, a dangerous invention whereby the application of a Greek word gave the impression that an unknown condition was recognized as an entity. The application of the term to the present discussion meant that there was a congenital weakness in retinal tissues which manifested itself in these varied forms. To speak, as Mr. Sorsby had done, of the Tay-Sachs condition as a retinal abiotrophy seemed to him to be unduly straining the theory.

Mr. Sorsby, in reply, said that abiotrophy was a pathological conception. It was true that the Tay-Sachs disease was not an abiotrophy in the ordinary sense, but was a familial condition, and did not come into the group of inflammatory lesions.

Calcium and parathyroid therapy in progressive myopia

Mr. F. W. Law said that these cases were gathered from the clinic of a municipal body, and all were children between 6 and 14 years of age. He discovered 25 myopic youngsters during six months in a total of 1,300 children

who were sent for refraction tests: but there were reasons for not placing any trust in this proportion as a working guide. The proportion of refraction subjects in these clinics on the minus side of emmetropia was 19 percent, in comparison with 57 percent on the plus side. All the subjects were proved to have progressive myopia by observation for at least 12 months before treatment was commenced. No change was then made in their routine other than the administration of the drugs mentioned. Some of the earlier cases were started on calcium lactate, 5 grs., with the Parke Davis preparation of parathyroid, and no conclusion was drawn as to the effectiveness or ineffectiveness of the treatment until 9 to 12 months had elapsed. The cases were divided into the following five categories: (1) those who satisfied all the conditions; (2) those who took the drugs but of whom the final record was obtained less than the fixed time after starting; (3) those who took the drugs for a short time and then discontinued them, but did not cease to attend; (4) those who took the drugs but did not attend again, and (5) those who either refused to co-operate by taking the drugs, or who failed to take them when supplied. Comparison was made with a number of controls.

The majority of these cases, he said, responded favorably, and his view was that the use of these drugs should at any rate be continued for some considerable time in cases of this serious disease.

Experimental grafts of devitalised corneal tissue

Mr. Tudor Thomas said that in a successful case there was little reaction, but when the graft was less successful, as when one part of the margin failed to unite primarily, considerable vascularisation took place. In the experimental grafting of devitalised tissue of two rabbits, the grafts were removed and put into olive oil at 100°C. for 15 seconds and 40 seconds respectively. Probably the tissue was killed in 15 seconds, the graft being completely altered in shape, color and consistence, i.e., now firm and opaque. Both grafts became united. One animal died ten months after the operation, the other was still alive, 18 months after the operation. In each case the stitches were removed on the 8th day. The first graft was uniformly united, the iris was not adherent, there was no corneal haze, nor any new formation of blood vessels. This graft had been heated 15 seconds. The second graft, which was heated 40 seconds, was of a brownish-yellow color, the iris was not adherent, and the eye showed no appreciable reaction. At 11 days the graft was well united, there were no vessels in the cornea, it was cloudy and gelatinous in appearance, and in the center of the graft at this stage there was a small area through which the red reflex could be obtained. On the 13th day a little aqueous leaked out, but soon the condition of the eye was as before. At five weeks there was a little margin of scar running around, but no vascularisation of the cornea, nor extension of blood vessels from the periphery.

These grafts were incapable of forming new tissue themselves. The union was less secure than it would have been had grafts of living tissue been used. In the course of time some thinning took place.

Retinal detachment in aphakia

Mr. C. Dee Shapland said that 10 percent was the proportion of retinal detachments in aphakic subjects, therefore aphakia must be regarded as a predisposer to retinal detachment. The 50 cases on which the present paper was based could be divided into two groups: those in which the retinal detachment followed needling of a soft cataract, and those which occurred after extraction of a hard cataract.

With regard to retinal detachment following cataract extraction, of the 28 cases of this condition 20 were males, 8 females, the average age being 62 years. The youngest was aged 40, with lamellar cataract, and the oldest a woman aged 82 years, who had a senile cataract. In two patients both eyes were affected. Thirty-nine of the 56 eyes had had extractions, and detachment was present in 30 (or 76.9 percent). As to etiology, antecedent myopia and vitreous loss were the important factors.

There was among these cases no example of detachment occasioned by direct violence, and in only 3 was there indirect trauma. Of the 30 eyes affected with retinal detachment, retinal holes were found in 12 (40 percent). Rounded and irregular holes were the kinds most frequently observed. There was a myopic group, a vitreous loss group, and a group in which no other factor than the aphakia could be elicited. Of all cases operated upon, 18 percent were cured.

With regard to prophylaxis, two points arose which were of importance in this regard: (1) vitreous loss at the cataract extraction was a serious complication, and every effort should be made to lessen its frequency. Loss of normal vitreous was more important than loss of degenerate vitreous: (2) capsulotomy should be avoided in cases in which medium or high myopia was present.

As to retinal detachments following discission of the lens, there were 22 of these cases, of an average age of 38, the youngest being 17, the eldest 51 years. Needling for myopia should have no place now in the ophthalmic surgeon's armamentarium.

In the present state of knowledge on the subject it was only possible to reiterate the advice of Mr. Foster Moore, namely, that one eye only be needled in childhood, its fellow being left in reserve, unless the cataract was so dense as to make the eye, if unoperated upon, of little value. Vision of 3/60 should represent a useful standard, instead of the 6/18 6/23 usually adopted. Operative results had been disappointing.

(Reported by H. Dickinson)

LOS ANGELES SOCIETY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

April 23, 1934

Dr. F. H. Brandt presiding

Glioma of the retina; report of a case with intraocular extension

Dr. Carl Rand (by invitation) drew attention to the work of Hu wherein the similarity of retinal tumors and brain tumors might be traced to the common embryologic origin of retinal and brain structures. The retinal epithelium arose as a budding off of the medullary epithelium the anlage of the central nervous system. In neuro-epithelioma of the brain, structures resembling the rosettes of retinal tumors were found. In medulloblastomas neuroglia and neuroblasts might be found.

Gunker's classification of retinal gliomas was given; (1) medullo-epitheliomas arising from the cells of the primitive neural tube and primitive retinal epithelium containing cell forms principally of medullary epithelium but also retinoblasts and spongioblasts and exhibiting neuro-epithelial rosettes; (2) retinoblastomas composed of retinoblasts. These tumors arose in the posterior part of the retina extending rapidly into the orbit to invade the brain and showed distant metastases; (3) neuro-epitheliomas composed of primitive spongioblasts arranged in true rosettes. They were said to arise from the external nuclear layer or the ciliary processes. These tumors were less malignant.

Dr. Rand pointed out that Reese in 1931 reported in 119 cases of enucleation for glioma of the retina 52 percent already had optic nerve extension and in 81 percent of those with optic nerve extension, the optic nerve had been severed distal to the point of extension and gliomatous tissue remained in the stump. This represented 43 percent of the total 119 cases having a possibility of intracranial extension.

Some cures had resulted following high voltage x-ray therapy usually in cases where a small tumor was discovered in the fellow eye incidental to the diagnosis of a larger tumor in the other eye.

Dr. Rand reported the case of a girl of 4 years and 7 months of age in which enucleation of the eye had been performed four months previously and section showed that the optic nerve which had been avulsed up to the optic foramen was invaded to the very end and intracranial extension was evident. Deep x-ray therapy was followed by extensive intraorbital recurrence, the en-

tire orbit being filled. The vision of the opposite eye was impaired and the field showed temporal constriction suggesting chiasmal involvement.

An intracranial approach was made by turning a frontal flap and the roof of the left orbit exposed and removed. The tumor was removed piece by piece and the nerve severed at the chiasm. The conjunctiva at the anterior end was torn inadvertently and provided a portal for possible infection. Following operation a cerebrospinal leak developed and through this avenue and the open conjunctiva an infection developed giving rise to a basal meningitis. The patient died. Autopsy showed gliomatous infiltration of both optic nerves and of the arachnoid on the inferior surface of the cerebrum and cerebellum.

In conclusion Dr. Rand stated that in all cases of unilateral glioma of the retina enucleation should be performed as early as possible and careful study of the sectioned nerve made. In certain cases when there had been extension along the optic nerve intracranially, resection from chiasm outward was indicated. It appeared that intracranial extension of gliomata occurred first along the optic nerve and finally breaking through the sheath, extended intracranially along the base of the brain in the subarachnoid spaces.

Discussion. Dr. Clifford Walker inquired if the tendency toward fistula formation could not be controlled by a graft of fascia lata. He also mentioned that if there was a delay of several days between enucleation and removal of the nerve, there would be the possibility of tumor cells growing into the conjunctiva from the cut end of the nerve which cells would not be eradicated by intracranial removal of the nerve alone.

Dr. Frank Detling asked what was the method of approach for removal of the intracranial portion of the nerve.

Dr. M. F. Weymann inquired if Dr. Rand had run across descriptions of metastasis where the tumor had been still confined to the globe.

Dr. Rand stated that he would like to try fascia lata to control the fistula formation as suggested by Dr. Walker. The method of approach was by turning down a flap similar to that used for gaining access to the pituitary gland. In the case mentioned by Dr. Dow an interval sufficiently long after the enucleation to permit of healing of the conjunctiva would be allowed before removal of the nerve stump. The conjunctiva should be healed to prevent fistula formation. In those cases where metastasis was reported the tumor had ruptured the globe and grown to enormous size. Some such cases were reported as having occurred in China where neglect of the patient had allowed the tumor to rupture the globe.

Harold F. Whalman,
Recorder.

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

October, 1933

Dr. Leighton F. Appleman, chairman

Apparent optic atrophy with recovery of normal visual acuity

Dr. F. H. Adler read a paper on this subject which was published in the Arch. of Ophth. 1934, v. 11, June, p. 942.

The newer forms of bifocals

Dr. Alfred Cowan said that the two types of bifocals most widely known at the present time were the fused and one-piece bifocals, known by a variety of trade names. Neither could be made optically perfect, but they could be made to meet the practical requirements of good bifocals and were now nearly universally used because of their appearance. No bifocal was truly invisible. Certain fused bifocals that were being widely exploited, had the upper portion of the segment cut off. The segment was cut in order to bring the center of the reading portion close to the center of the distant lens and so eliminate the so-called "jump." It did eliminate the "jump" at the upper portion of the reading lens, but there was a decided "jump" at the lower edge of the segment, at the place where it might be very annoying. It also made the segment more visible and introduced a mir-

ror surface which might or might not be annoying.

In spite of the stressed points of superiority one read of in various advertisements, there was no bifocal made that was invisible; in which the reading portion was of perfect shape and size for all purposes and for every wearer; in which there was no "jump;" and in which both far and near glasses were corrected to the very edge.

The ophthalmologist must combat the commercial dominance of certain lens forms by making himself familiar with the basic optical principles of ophthalmic lenses and always specify in standard terms the exact coflexure, type of bifocal and color of glass as well as the dioptric power of his lenses.

Discussion. Dr. F. H. Adler said that what was needed was an equivalent to the drug pharmacopoea, and then when writing prescriptions for glasses, one could look over the list and put in the proper name of the lens. Very often the choice was left to the optician, merely because we had no standard terminology of our own.

Dr. Cowan said, in closing, that there was a standard term to describe almost any type or style of lens. This should be known and used whenever possible in preference to trade names.

The clinical determination of the light sense threshold

Dr. Edmund B. Spaeth read a paper on this subject which was published in the Arch. of Ophth., 1934, v. 11, March, p. 462.

A. G. Fewell,
Recorder.

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EDITORIAL STAFF

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640 S. Kingshighway, Saint Louis

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HEADACHES

So many people have been relieved of headache by wearing glasses that a large part of the community thinks of eyes and glasses when they become conscious of headache. To get relief they seek the advice of an oculist, optometrist, or optician—some one whom they have heard of, who has to do with glasses.

They do not always get relief; even when they go to the shop with the largest stock of "optical goods," and the best looking propaganda pictures in the show window; or the largest advertisements in the daily papers, and a fine framed certificate of "Doctor of Optometry" in the "consulting room." When they have tried glasses and have not been cured by them, they are convinced that glasses are no good. They do not know, that of the thousand combinations that might be made from a trial set, only a dozen could be of much help, and only one could really correct the eye.

Of the myriad remedies that have been tried for headache, none has a broader base of clinical experience to justify its reputation than the wearing of glasses. As a larger proportion of people come to work at things that require continuous accurate vision, the dependence of headache on nerve strain by use of the eyes will be more widely recognized, but the eye physician must still be a physician, broadly trained in medicine and alert to recognize that there are other causes than errors of refraction, that may produce headache. Other forms of nerve strain, such as that which induces high blood pressure; departures from the normal balance of living; indoor air and other poisons; protracted working hours, with neglect of other bodily activities that are needed to preserve general health; habitual errors of diet; obscure congenital conditions that may underlie migraine; hereditary tendencies that mark certain families; and, particularly, local conditions and congestions in the upper air passages and within the cranium, must

all be considered in the diagnosis of headache. Eyestrain may be one cause, but others may have to be removed before the headaches will cease. Habits of sleep, coffee drinking, reliance on hypnotics, may all need investigation, before the diagnosis of eye headaches may be adopted.

On the other hand it is not the amount of hyperopia, or astigmatism that determined the headache. The nerve strain induced by keeping up accommodation, or convergence; or the poor light used, or the impaired circulation entailed by a sedentary occupation may cause headache. Errors of refraction may need to be corrected, but other departures from hygienic living and work may also require correction. Success in preventing headache will depend as much on a broad medical view of its possible causes, as upon the accurate measurement of the refractive error.

In deciding whether glasses are needed in a particular case, and how much of the time they should be worn, and what prognosis can be given as to relief, a broad view of the patient's general health needs and problems is as important as in any other department of medicine, or surgery. The probable share of eye work and strain in causing headache cannot be known until other possible factors have been considered. The particular kind, or high degree of refractive error, or the amount of improvement in vision cannot be relied on, as indicating the need for glasses. The highest degrees of hyperopia and astigmatism very rarely cause headache. Myopic individuals are often strikingly free from headache, yet they may suffer from it if astigmatism of low degree is present, or because myopia entails excessive convergence. In the fitting of glasses the physician needs the broad view that comes by wide medical study and experience ripened by careful thought.

The breadth of this subject was illustrated at the recent meeting of the British Medical Association, at Bournemouth, the home of the late E. E. Maddox. In the Section on Ophthalmology there was a discussion on headaches. This was opened by a London ophthalmologist, who said that 24 percent of his private patients came because of headache. He spoke of the "week-end headche," suffered by the patient who makes every possible attempt to carry on during the week. A neurologist thought migraine rarely had any direct connection with ocular conditions. A rhinologist pointed out that the large air cavities were lined with mucous tissue supplied with exquisitely sensitive nerve endings. Two ophthalmologists called attention to the importance of muscle imbalance. The narrowing effect of special practice can be counteracted by discussions with colleagues, who see the facts from other points of view.

Edward Jackson.

RETINOSIS PIGMENTOSA DEGENERATIVA

Night-blindness was well known to the ancients. Pliny, as quoted by Yudkin says,

"Goats can see at night as well as by day and in consequence those who are called night-blind regain their sharpness of sight in twilight if they eat the liver of a goat" and Dioscorides of the same era, advises that "the juice which flows from the liver of a goat when roasted and used as an ointment benefits the night-blind."

This is particularly interesting since our recent studies have shown the value of the internal secretions in many serious forms of disease.

There has always, however, been some confusion in the terms by which the condition known as night-blindness was designated. The Greeks called it "nyctalopia" which is of as doubtful accuracy as the "hemeralopia" of today. Night-blindness, or amblyopia in the twilight, is a clinical symptom apparent to those so afflicted, but the retinal torpor which causes the diminished reaction of the retinal elements to the light rays, although not so evident, does exist also in the day time as may be determined by the measure of the light sense.

It was not until Helmholtz put the ophthalmoscope in the hands of that keen observer Donders that the actual pathologic picture was brought into view. That this was not an inflamma-

tion, as the name retinitis would indicate, but a degenerative process in the neurons, Donders and others recognized.

Leber writing in the first edition of the Graefe and Saemisch Handbuch der Augenheilkunde (p. 634), under the heading of Pigmentary Degeneration of the Retina said that the name was inaccurate as it was a degenerative and not an inflammatory process. The clinical symptom of inflammation, that of vascular hyperemia was wanting, the vessels being narrowed and not dilated. Its progress too, was slow, extending through a period of years. Nevertheless, with curious inconsistency, he continued to call it "Retinitis pigmentosa."

More recent studies too, have made clear that the pathology found in the eye does not constitute an entity that may be locally attacked. Often degenerative changes in other parts of the body are present. According to Nettleship's estimate 33 percent of those having primary or congenital pigmentary degeneration of the retina were deaf mutes and at least 4 percent of deaf mutes had this characteristic progressive retinal degeneration. Where mutism is absent there may be speech impediments together with physical deformities, polydactylism, epilepsy or endocrine imbalances such as the Biedl-Laurence syndrome, etc. All of these indicate a profound modification of the initial cell plasms and give force to Treacher Collins' conclusion that retinal pigmentary degeneration, macular pigmentary degeneration, and amaurotic familial idiocy are all due to a tendency to degeneration in the nerve cells. Any one of these may be, as familial amaurotic idiocy is, accompanied by a similar tendency to degeneration of the ganglion cells of the central nervous system and should be classified as forms of abiotrophy or, as Verhoeff prefers, "premature senility."

The manner in which the pigment migrates from the pigment epithelial layer into the substance of the retina has been beautifully described by Collins.* The destruction commences, he says, in the peripheral rods and cones. As they disappear, gaps are left in the membrana limitans externa and tracks are formed through which the pigment cells can make their way. These possess the power of ameboid movement. When stimulated by light they throw out filamentous processes between the outer segments of the rods and cones and on the removal of the stimulus retract those processes into the body of the cell. They possess a capacity for positive phototactic movement which is kept in check only by their anatomic relationships. When these are altered by the atrophy of the rods, cones and the nerve elements of the retina so that only a network of neurological tissue remains, the pigment epithelial cells attracted forward by the stimulus of light are able to make their way into the innermost layers of the retina where they accumulate around the blood vessels and give rise to the characteristic patches.

Collins refutes the inference that this retinal pigmentary degeneration could be due to sclerosis of the choroidal vessels. Pathological examination of the eyes in cases of "retinitis" pigmentosa (as even he continues to term it) in different stages of the disease has shown that it might occur without any such thickening of the choroidal vessels having been present. It may arise in the retinal neuro-epithelium, which having attained its full normal development, degenerates. This tendency must be due to some inherent weakness in the affected cells.

Verhoeff has shown that the changes in the vessels are not the cause of the changes in the neuro-epithelial layer because even greater vascular changes such as closure of the central retinal artery, as in arterio-sclerosis, do not lead to degeneration of the neuro-epithelium.

From the beginning it was thought by many ophthalmologists that pigmentary degeneration of the retina must pursue its slow process of destruction until the receptive neurons were all destroyed, but possibly because it continued to be officially designated as a "retinitis," and because the prognosis was otherwise so hopeless, various measures of treatment were attempted but none of sufficiently assured value to be authoritatively rec-

* An International Congress of Ophthalmology, Washington, D.C., 1922, p. 118.

ommended. Among the most recent is that of Royle of Australia who has had sympathectomy performed with apparently some enlargement of the visual fields, with the view of causing dilatation of the vessels by releasing the sympathetic control, thereby aiding the nutrition of the neurons. Others have had the cervical ganglion removed with doubtful results. It is by no means agreed that even if the degenerative changes were dependent on a vascular spasm in the choroidal or retinal vessels, an inhibition of the functioning of the sympathetic nerve terminals would result in their permanent dilatation. Collins, says Duke-Elder,* has brought forth a large amount of evidence to show that the chromatospheres all over the uveal tract may become spherical and more heavily pigmented if their nutrition or nerve supply is interfered with. If so, the cutting off of the sympathetic with its extensive distribution would simply result in adding one degenerative process to another. A similar measure was attempted two decades ago for the relief of glaucoma, but it was soon discarded. Duke-Elder concludes that physiologically, the vaso-constrictor nerves undoubtedly cause a constriction of the vessels of the uveal tract but that their precise effect on the retinal circulation has been questioned and many contradictory results have been found in the literature.

Mr. Hepburn vigorously controverts Treacher Collins' theory and assigns greater importance to the contiguous vascular relationships but even if the arterioles and the chorio-capillaris are also affected as shown in some instances by a thickening of the coats and a narrowing of their calibre this is far from being an inflammation but is equally a degenerative change. Research will probably lead to the reticulo-endothelial system with the primary disturbance in some of the internal secretory glands such as the suprarenal cortex, the hypophysis or even as was surmised two milleniums ago, it may have its source in toxins from the liver. Whatever may be the etiology of this malady it is quite evident that it is *not* of inflammatory origin.

One of the first requisites in scientific medicine is precision in its terminology. A name which conveys a dubious conception of the facts on which it is based is misleading. It suggests wrong measures for its treatment, and it should be removed from the literature. The faulty designation *"retinitis"* would better be replaced by the more accurate descriptive one of *retinosis* pigmentosa degenerativa.

A test that might be of value before attempting a difficult surgical procedure that has at times resulted disastrously would be to measure the light sense under carefully observed conditions, then to inject intramuscularly a full dose of aceticholine under which dilatation of the retinal vessels might be expected, if it could be obtained, then again to test the light sense under similar conditions. If, after a suitable time there should be an increase in the light sense, improvement under some method of treatment might be looked for.

Wibaut* of Amsterdam has used the female hormone menformon in primary retinal pigmentary degeneration in certain cases with most remarkable results. Of six cases treated with this substance two were markedly benefitted, one indeed, that of a gardener who had become so blind that he had to be led about, so far recovered his sight that he was able to resume his former occupation. Three were definitely improved and one only, a case of long standing, was not improved. Subjective betterment in several cases under this substance was reported by van der Hoeve and Weve.

The meaning of "subjective improvement" will be better understood if we recall that the destroyed neurons cannot be revivified. When the field is enlarged or the light sense raised it can mean only that those fibers suffering from torpor retinae and which are still vital have been activated. In one of Wibaut's cases the light sense was raised one hundred times.

Menformon is obtained from the

* Duke-Elder's Text Book of Ophthalmology.

* Wibaut's Behandlung von Retinitis pigmentosa mit weiblichen Hormon. (Menformon). Deut. Med. Wöchenschr. no. 41, 1931.

placenta, from the urine, the blood or other substance of the pregnant female. It appears to have a remarkable cytogenic effect. It and a preparation known as theelin, another estrogenic substance, made in this country and having a higher number of mouse units per cm. have been considered by the Council of Pharmacy of the American Medical Association but approval has been reserved until further evidence of their clinical value has been determined. This is a substance, however, concerning which carefully regulated observations may be very properly made.

If there are remedies which can activate the torpid but still vital neurons they should be carefully studied. The eyes of every deaf mute should be examined to determine how widespread are associated retinal changes so that if this or some similar hormone can stay the progress of a condition otherwise so inevitably fatal to sight, we should be prepared to administer it promptly before the blackness of night has shut out all of the light.

As the endocrines in their relation to the eye constitute one of the major subjects for the consideration of the next International Ophthalmological Congress, might not the terminology, the pathology and the treatment of pigmentary degeneration of the retina be a subject worthy of consideration?

Park Lewis.

DEFINITION OF BLINDNESS

The executive and legislative functions of the American Medical Association are vitally important to the physicians of the United States, for therein rests much that has a bearing on his economic success. The delegates who represent the interests of ophthalmologists in the legislative assemblies are deserving of sincere thanks for the time and thought which they give to this work.

One of the measures which was passed at the legislative session in June, 1934, in Cleveland, was a "Resolution on the Definition of Blindness." This was formulated by a committee appointed by the Section on Ophthalmology. It read as follows:

"Resolved, That the following definitions for grades of blindness be accepted by the House of Delegates:

Total Blindness is inability to perceive light: lack of light perception. The person who is totally blind cannot tell whether strong light falls on his eyes or whether they are in total darkness. Light perception is vision such as one has when the eyelids are closed.

Economic Blindness is absence of ability to do any kind of work, industrial or otherwise, for which sight is essential. In general, visual acuity of less than one tenth has been classed as economic blindness, meaning that objects can be recognized only when brought within one tenth of the distance at which they can be recognized with standard vision. Such vision in the better eye when corrected with the best possible glass would be recorded as less than 0.1 or 6/60 or 20/200, or an equally disabling loss of the visual field.

Vocation Blindness is impairment of the vision that makes it impossible for a person to do work at which he had previously earned a living. He may still have vision enough to do some other kind of work that may yield him an adequate support. Such vision in the better eye with the best possible correcting glass may vary from one tenth to one third; that is, from 0.1 or 6/60 or 20/200 to 0.3 or 6/18 pt 20/60, depending on the vision required for the occupation previously followed.

Education Blindness is such loss of sight as makes it difficult, dangerous or impossible to learn by the methods that are commonly used in schools. This necessitates two types of schooling for such individuals; namely, sight saving classes and schools for the blind. The requirement for admission to sight saving classes is vision in the better eye with the best possible correcting glass of less than 20/70 and more than 20/200.

The requirement for admission to the school for the blind is vision in the better eye with the best possible correcting glass of 0.1 or 6/60 or 20/200 or less."

This definition is a matter of no small importance to ophthalmologists for there is very frequent necessity for the use of terms describing degrees of blindness and to have an agreed conception of exactly what is meant by each term will be extremely valuable.

Perhaps this will not be the final form. The essential elements are satisfactory and that is the vital matter. Some features are not entirely clear and others seem scarcely to have a place in the resolution. With the definition of total blindness there can be no quarrel though the explanation of light percep-

tion seems out of place in the same paragraph. Clause two is scarcely so well stated. The first sentence is awkward, not being helped any by the use of the adverb "otherwise" instead of the adjective "other" to qualify "work." The sentence however conveys its intent fairly well and is a satisfactory definition of economic blindness. The arbitrary figures set are open to endless argument but possibly are fairly average. The last clause of this paragraph unfortunately clouds the whole issue as who can say without definition what is "an equally disabling loss of the visual field." Why omit loss of the muscle fields, a factor in most of the compensation statutes in the various states.

Vocational blindness is well defined in the first sentence of the paragraph but it seems rather absurd to attempt to set the limits for this kind of blindness. For the watch repairer one third vision would be far too little and vocational blindness for him would be much higher.

Educational Blindness is defined rather too loosely. The "dangerousness" scarcely belongs in the definition, and the description of the visual requirements for sight saving classes and blind schools surely has no place in the resolution. It would have seemed simpler to have stated merely that educational blindness was an amount of vision inadequate for obtaining instruction unassisted, in the usual schools for the sighted. The reader wonders to what school reference is made in the last sentence.

Possibly the criticisms are too trivial. Certainly the resolution is a step in the right direction and in general it delineates quite reasonably the various degrees of blindness and should prove helpful to ophthalmologists.

Lawrence T. Post.

A COURSE IN OPHTHALMOLOGY AT BARCELONA

Steadily advancing standards in ophthalmology have stimulated the creation of new systematic courses of postgraduate instruction. The readers of the American Journal of Ophthalmology will be interested in learning of the inauguration of what practically amounts to a six-months teaching course at the Spanish city of Barcelona.

The second largest city in Spain is widely known to ophthalmologists throughout the world by reason of Barraquer's work in cataract extraction, and a number of American ophthalmologists have already visited Barcelona for the purpose of witnessing vacuum extraction of cataract at the hands of its inventor.

Few native citizens of the United States are good linguists, but fortunately Professor Barraquer has a splendid command of the English language, as was agreeably demonstrated during his visit to the International Congress of Ophthalmology at Washington, D.C., in 1922, and again during the Madrid Congress last year.

Study in a foreign city often affords a particularly pleasant combination of self-improvement and recreation. This fact has been responsible for many thousands of medical pilgrimages to London, Paris, Berlin, Vienna. and other cities.

Barcelona is a picturesque city of great antiquity, in a country whose history and monuments appeal to every lover of romance. The port is within a few hours journey of the Balearic Islands, residence of Chopin and Georges Sand and of hundreds of other distinguished writers and artists.

The Province of Catalonia, of which Barcelona is the principal city, holds a conspicuous place in Spanish history by its repeated attempts at political independence. It is contiguous with ancient Provence, and its language, Catalán, now ranking equally with Spanish in the public schools of the region, has much in common with Provençal, the language of the troubadours.

It is interesting to note that announcement by the University of Barcelona of the new course in ophthalmology is made in Spanish and in Catalán, although prospective American students may not be altogether attracted by the statement that the classes will be given in Castilian (Spanish), Catalán, or French, as may be previously agreed between professors and pupils!

Presumably a cosmopolitan group would select the French language for the lectures, which are to be given three days a week for twenty-five weeks. The balance of the course will consist of operative sessions which will occupy the remaining three days of each week.

The conduct of the course is to be divided equally between Professor M. Soria, chief of the ophthalmologic service of the faculty of medicine, Professor I. Barraquer, chief of the ophthalmologic service of the Hospital of Saint Paul, and Professor J. Gomez-Marquez, chief of the ophthalmologic service of the Sacred Heart Hospital.

This season's course began on November fifteenth. Announcement of the course arrived too late for earlier publication in the American Journal of Ophthalmology. It is to be hoped that the course will be repeated from year to year and that it will be attended by a number of visitors from the United States. Successful matriculants will receive a diploma in ophthalmology.

W. H. Crisp.

BOOK NOTICES

Glaukom und Netzhautzirkulation. (Glaucoma and the retinal circulation.) By Maximilian Salzmann, 68 pages. Special publication of part 15 of the "Abhandlungen aus der Augenheilkunde und ihren Grenzgebieten," accompanying Zeitschrift für Augenheilkunde. S. Karger, Berlin.

The condition of the central retinal vein is reported in 65 eyeballs, removed because of absolute glaucoma. In this series, there are included no eyes with tumors nor those with staphyloma, enucleated for cosmetic reasons. Among these 65 eyes, the central vein was entirely normal in 8 eyes. Mild changes in the central vein (inflammatory infiltration, compression, mild narrowing) were present in 10 cases. The number of cases in which the vein was considerably constricted, the thrombus definitely did not close the lumen, or the complete closure was not unquestionably proven numbered 29 or 44.6 percent. In the remaining 18 or 27.7 percent, anatomical examination shows a complete closure of the central vein. The most important conditions resulting from this closure, collateral circulation in the optic papilla from the choroid, massive extravasations of blood in and from the retina and prepapillary proliferation of connective tissue from the organization of hemorrhage occur together in 34 cases. The frequency of the venous closure, secondary to glaucoma has been hitherto underestimated. In only one of the author's cases is it certain that the closure of the central retinal vein preceded the glaucoma. The essential anatomical changes appear to occur as follows: compression of the vein in the lamina cribrosa, thickening of the wall of the vein with constriction of its lumen, closure of the vein by thrombosis and in several subsequent stages complete obliteration of the central retinal vein.

This work is important because in a considerable number of cases, there was found the more or less complete closure of the central retinal vein, secondary to the retinal atrophy in glaucoma. It is true that this secondary closure of the vein has not hitherto been emphasized in anything like the degree its frequency deserves.

Harvey Lamb.

Bulletin de la Société Belge d'Ophthalmologie, number 68. (Transactions of the 68th meeting of the Society at Brussels.) Paper covers, 105 pages, illustrated. Price not stated. Brussels, Imprimerie Médicale et Scientifique, 1934.

The society meets twice each year. This report of the spring meeting in 1934 contains the usual list of members of the society, and reproduces sixteen papers read or case reports presented on that occasion, with some discussions. Abstracts of most of these communications will appear later in the American Journal of Ophthalmology.

William H. Crisp.

ABSTRACT DEPARTMENT

EDITED BY DR. WILLIAM H. CRISP

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education, and history
19. Anatomy and embryology

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1. GENERAL METHODS OF DIAGNOSIS

Feldman, J. B. **Instrument for determining course of dark adaptation and for measuring minus light threshold.** Arch. of Ophth., 1934, v. 12, July, pp. 80-85.

The author reviews the reports of previous investigators and describes an instrument which affords a variation in the stimulus from a minimum of 1 to a maximum of 500,000 micromillilamberts, without change in quality of the light. The adjustments can be made in the dark, without distracting the patient's attention, by means of an iris diaphragm and Wratten filters. The patient is unable to tell which eye is being examined or the position of the stimulus until the light threshold is reached. The procedure is the same as previously described by Derby. J. Hewitt Judd.

Galante, E. **The light sense in the tuberculous and diabetic.** Rassegna Ital. d'Ottal., 1934, v. 3, May-June, p. 389.

Galante conducted experiments to determine whether the light sense was affected in tuberculous and diabetic subjects whose eyes presented no demonstrable pathologic changes. He found this function attenuated in the tuberculous and markedly reduced in the diabetic. He advances the hypothesis that such conspicuous reduction in the diabetic may depend upon a reduced glycolytic action of the retina. In the tuberculous the attenuated light sense is probably the result of general lowering of vitality. Eugene M. Blake.

Marcus, I., and Youdkevich, D. **The diagnostic value of blood studies in ocular diseases.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 458.

This is a detailed report of blood examinations of 353 patients, grouped according to ocular diseases. The blood picture may be of diagnostic assistance particularly in diseases of luetic etiology. The white blood cells being very sensitive to syphilis, the blood picture may show lymphocytosis, monopenia, and eosinophilia. There is frequently a diminution of blood platelets, and a lowered percentage of hemoglobin with a normal erythrocyte count.

Ray K. Daily.

Pascal, J. I. **Calculating stereoscopic vergence.** Arch. of Ophth., 1934, v. 11, May, pp. 807-813.

Stereoscopic vergence is defined as the direction of the two visual axes when corresponding points are fused on a stereogram. If these converge the stereovergence is plus, if they diverge it is minus. It is made up of the plus

prism vergence produced by prisms with bases out and chart vergence. The kind and amount of the latter are obtained from the formula $D = 100d \div L$ in which D equals the number of prism diopters, d the difference in centimeters between the interpupillary distance and the separation of corresponding points on the stereogram, and L the distance of the stereogram from the eye in centimeters. J. Hewitt Judd.

Thomasson, A. H. **A plea for greater uniformity in methods of field taking.** Arch. of Ophth., 1934, v. 12, July, pp. 20-32.

To aid interpretation of published fields, one should always record the visual acuity, size, and color of the test object and the radius at which it is used, and the quality and intensity of the illumination. The author advocates standardized charts and daylight illumination. The smallest normally perceptible white object is about a 0.5-mm. object at four meters. Examination of the central field (within 25 degrees) for early detection of a scotoma must be made on a tangent screen. Routinely, if the vision is 20/20 the author uses a 0.5-mm. white object at 1, 2, 3 and 4 meters and a 2-mm. red or green object at 2 or 3 meters. If the visual acuity is reduced, larger objects must be used, the size being determined by the visual acuity. The peripheral field is examined with a 5-mm. white object.
J. Hewitt Judd.

Trantas, A. **Gonioscopy.** Arch. di Ottal., 1934, v. 31, Jan.-Feb., pp. 39-56.

The author recommends gonioscopy with digital pressure. The subject is dealt with under the heads of a number of clinical conditions. In a case of high myopia with retinal detachment, and with severe hypotension, the author saw a red circle paralleling the border of the ciliary body, and which he regarded as the canal of Schlemm, filled with blood in consequence of irruption from one of the engorged vessels surrounding the canal. W. H. Crisp.

Trovati, E. **Functional reserve of retina in binocular field and in field of monocular panoramic vision.** Boll. d'Ocul., 1933, v. 12, Aug., pp. 755-769.

The author examined cases of myopia and hyperopia on the perimeter, with an angular deviation of the head of thirty degrees. He found an increase of the visual field for form and colors, which was, however, less marked in cases of high defect of refraction. The same result was obtained in testing the field of binocular vision and of monocular panoramic vision. The author describes a new perimeter for this kind of test. (Three figures.) M. Lombardo.

Uribe Troncoso, Manuel. **Clinical gonioscopy.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 361.

The technique of gonioscopy is given in detail. The conditions in which clinical gonioscopy is useful include congenital anomalies of the angle, injuries in the region of the angle, inflammatory conditions of the angle and their sequelae, atrophy of the iris, anterior corneal synechia, tumors or pseudotumors of the iris and ciliary body, glaucoma, and operations in the limbal region. Beulah Cushman.

Walker, C. E., Jr. **A modification of the Haitz charts.** Amer. Jour. Ophth., 1934, v. 17, Oct., p. 953.

2. THERAPEUTICS AND OPERATIONS

Batignani, A. **Contribution to vaccine fever therapy in ocular diseases.** Lettura Oft., 1934, v. 11, March, p. 141.

Seventy-five cases were treated and studied. Among them were thirty-five of keratohypopyon with or without dacryocystitis. There were five cases of phlegmonous dacryocystitis with periostitis, eight of trachoma with corneal complications, ten of perforating injuries, three of vitreous hemorrhage, and three of luetic parenchymatous keratitis. Antipyogenic vaccine was administered intravenously in large doses, the amount depending on the effect desired. Severe cardiac and renal disease were the only contraindications. The gains resulted from the febrile reaction and the leucocytosis. In parenchymatous keratitis unhoped-for benefit resulted. The author counsels use of vaccine and

of antiluetic chemicals, contemporaneous or with a very brief interval between their administration. Diffusion of the chemicals seems to be favored by the leucocytogenic action.

F. M. Crage.

Chramelashvili, H. **A stiff bandage.** Sovietskii Viestnik Ophth., 1934, v. 4, pt. 5, p. 479.

A postoperative bandage is fastened with ties over the forehead and upper lid, covering the eye without closing it. It thus protects the eye from light and traumatism, without interfering with normal moistening of the eyeball and without raising the temperature of the conjunctival sac. Ray K. Daily.

Dimitry, T. J. **The eye dropper.** Jour. Amer. Med. Assoc., 1934, v. 102, June 30, p. 2180.

Three eye droppers were devised to minimize the hazards of contamination of eye drops by the rubber of the bulb. (Three figures.)

Ferrari, A. **Concerning the value of sulpho-pyrotherapy in some ophthalmopathies, with particular regard to nonluetic forms.** Arch. di Ottal., 1934, v. 41, March, p. 127.

Two c.c. of colloidal sulphur was injected intramuscularly every two or three days, and in grave cases every twenty-four hours. These injections were followed by considerable rise in temperature, and great improvement resulted. Best results were obtained in ulcers of the cornea, parenchymatous keratitis, uveitis, iridocyclitis after cataract extraction, and septic wounds of the cornea with hypopyon. In glaucoma cases this type of treatment had no effect on the intraocular tension. Two cases of optic tabes were also treated by this method, and considerable improvement in vision was obtained. Herman D. Scarney.

Glees, M. **Clinical experience with syntropan and pantocaine.** Klin. M. f. Augenh., 1934, v. 92, June, 801.

Syntropan produces adequate mydriasis without signs of irritation and no practical effect on accommodation or intraocular tension. It takes about thirty-five minutes to produce maximal mydriasis. Experiments with dilutions of pantocaine demonstrated that a one-half percent solution was as effective as one percent for diagnostic purposes and in minor therapeutic procedures. Greater dilutions are not so reliable and must be instilled repeatedly.

F. H. Haessler.

Gunderson, Trygve. **Subconjunctival iron deposits after adrenin injections.** Amer. Jour. Ophth., 1934, v. 17, Sept., pp. 807-808.

Jona, S. **A study of bacterial flora in the conjunctival sac after bandaging the eyes.** Rassegna Ital. d'Ottal., 1934, v. 3, March-April, p. 258.

The author studied the bacteriology of the conjunctival sac in thirty-four operative cases, before and after bandaging the eyes for twenty-four hours, the secretions being cultured and the colonies counted. He observed great discordance in the virulence of the secretion before and after bandaging, and also great variation in the number of colonies. He advises that microscopic and cultural studies be made before and after bandaging the eyes as well as counting of colonies and tests of virulence several days before a contemplated operation. Eugene M. Blake.

Majoras, Johann. **The use of posterior pituitary hormone in local anesthesia.** Klin. M. f. Augenh., 1934, v. 93, July, p. 81.

In patients who get cardiac palpitation, tremor, and a sense of oppression from adrenalin a substitute is desirable. Meropitan is a preparation of posterior pituitary hormone of such concentration that general manifestations are not to be expected. The difference between it and adrenalin is only quantitative. The former gives a slower and smaller but more lasting rise in blood pressure. Blood sugar is not increased. From clinical experience for two years the author prefers meropitan to adrenalin in glaucoma and cataract operations. In enucleation the field remained as dry as in anatomic dissection. There are no contraindications. F. H. Haessler.

Mayer, L. L. and Smith, R. D. **Ocular manifestations in tryparsamide treatment of syphilis.** Illinois Med. Jour., 1934, v. 65, March, p. 258.

In one year eighty-seven patients with neurosyphilis undergoing tryparsamide therapy were studied. Ocular tests consisted of measurement of corrected visual acuity and of peripheral visual fields for white and red, and evaluation of the optic discs with the Cohen fundus colorimeter. It was concluded that tryparsamide does not produce optic atrophy in cases where syphilis has not already damaged the nerve, and that intelligent administration of tryparsamide does not aggravate a previously existing syphilitic atrophy.

John C. Long.

Papagno, M. **A new instrument for fixation of the eye in operative work.** Rassegna Ital. d'Ottal., 1934, v. 3, May-June, p. 408.

Papagno discusses the various methods advised by the Italian school for fixation of the globe and recommends a new instrument. This consists of the addition to a Mellinger speculum of a clamping device which catches and holds the superior rectus tendon, keeping the eye rotated downward.
(Three figures.) Eugene M. Blake.

Rachevskii, F. **Provitamin A (carotin) in inflammatory eye diseases.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 470.

Balachovkskii used carotin locally in slowly healing wounds, on the hypothesis of a local avitaminosis. Because the eye is very sensitive to general avitaminosis the author tried local application of a five percent aqueous solution of carotin, with the addition of three to five percent ethyl alcohol, in forty-four cases of various inflammatory ocular affections (ulcers, keratitis, blepharoconjunctivitis and so on). In six cases of bilateral involvement one eye was treated with carotin while the other was used as a control. The carotin caused rapid improvement in the subjective symptoms, and hastened healing of intractable cases of keratitis.

Ray K. Daily.

Zass, P. **Local application of old tuberculin in tuberculous lesions of the anterior segment.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 1, p. 59.

Fourteen cases were treated by instillation into the conjunctival sac of a solution of old tuberculin, beginning with 1 to 2000 and gradually increasing the concentration. The course of treatment extended over two months. The results were particularly satisfactory in tuberculosis of the conjunctiva and of the superficial corneal layers.

Ray K. Daily.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Biffis, A. **Topographic researches on the sensibility of the retina by the photomotor reflex of the pupil.** Ann. di Ottal., 1934, v. 62, Aug., p. 665.

Utilizing the pupillary reflexes the author has endeavored to determine the sensibility of the periphery of the retina to light. He secured an absolute central scotoma. By making the obscuring zone increasingly large he was able to determine the reaction of the more eccentric portion. He demonstrated that outside of an area subtended by an angle of 43 degrees, 36 minutes, and 10 seconds there existed elements capable of producing a pupillary reflex. He also determined the minimum light intensity necessary to obtain the reaction. (Bibliography.) Park Lewis.

Birch-Hirschfeld, A. **A further communication on the combined method of functional testing of the eye.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 23.

The author's test card, in which each row of letters may be displayed alone, is illuminated by a light reflected from a lamp movable in a tunnel, at one end of which is a mirror at an angle of 45° to the axis of the tunnel. By moving this lamp the illumination of the test letters may be changed from two to eighteen Lux. The entire examination consists in determining the smallest row of letters visible when the card is illuminated with 2, 4, 6, 8, and so on to 18 Lux respectively. The results are expressed in a graph. When the graphs from a large number of patients are inspected, they

fall quite naturally into five groups. In group one the visual acuity ranges from 6/8 at four Lux to 6/4 at sixteen Lux. In group five the visual acuity is 6/11 at fifteen Lux and less than 6/8 at eighteen Lux. In incipient glaucoma, the visual acuity has been observed to fall from one group to another, though visual acuity as ordinarily measured, tension, and visual field are still normal. This method also demonstrates a distinct superiority of binocular over monocular visual acuity.

F. H. Haessler.

Dimitry, T. J. **Anatomic error in using base of nose as point of rest for spectacles.** Arch. of Ophth., 1934, v. 11, June, pp. 969-972.

The anatomy of the base of the nose is reviewed to demonstrate the ill effects caused by pressure of the pads on the newer type of spectacles which rest on the upper part of the nasojugal fold. Chief of these are the irritation of the underlying fibres of orbicularis oculi and the disturbance of blood flow in the anterior facial vein and the angular artery. (Drawings.) J. Hewitt Judd.

Ferree, C. E., and Rand, G. **Lamp for determination and measurement of the preferred intensity of light for reading and for other work.** Arch. of Ophth., 1934, v. 12, July, pp. 45-59.

By means of four vanes which extend across the opening in the lamp housing, the illumination can be decreased in continuous series from the full output of the lamp to 0 without change in color or composition of the light, in size, shape, or position of the illuminated area, or in the evenness of its distribution. The authors' glare baffle may be attached to the front of the housing. The stand is adjustable for height and direction. The maximum intensities of light are 40 and 90 foot-candles for 250 and 400 watt lamps respectively. (Illustrations.) J. Hewitt Judd.

Gil, R., Adrogué, E., and Sena, J. A. **Color vision.** Arch de Oft. de Buenos Aires, 1934, v. 9, Jan., p. 3, Feb.-March, p. 74, and April, p. 132.

The subject of color vision is thoroughly reviewed and brought up to date, including its physics, physiology, pathology and diagnosis. Special charts for graphic recording of anomaloscope findings illustrate the chapter on diagnosis. M. Davidson.

Gordon, B. L. **Importance of cephalalgia in ocular diagnosis.** Arch. of Ophth., 1934, v. 11, May, pp. 769-796.

This paper presents the main views on ocular headache as found in the literature and the findings in 1339 patients studied by the author, 805 of whom presented this symptom. He concludes that ocular headache is situated in the cranial muscles and is due to an abnormal nervous condition in the eye itself. Headache was found more frequent in adults between the ages of twenty and forty-five years and slightly more prevalent in women, 57 percent, and in certain races. The types and areas of localization of headaches caused by various ocular diseases and conditions are described. Asthenopic headaches were due to ametropia in 80 percent and to muscular anomalies in 20 percent. The author believes that children inherit the anatomic peculiarities responsible for asthenopia, since in 60 percent there was a history of headache in the parents. Patients with headache usually have good vision and those suffering the most usually have low errors, while headache is rare in persons with amblyopia or squint

J. Hewitt Judd.

Gualdi, Vincenzo. **New contact glasses for the correction of all ametropias.** Klin. M. f. Augenh., 1934, v. 92, June, p. 775.

The author uses contact glasses with a single inside curve. An oculist needs only a series of six of these glasses with a scleral curve of 10.5, 11, 11.5, 12, 12.5, or 13 mm. radius to enable him to discover which is most comfortably worn. He then determines the best vision with an ordinary trial case and sends to the factory in Florence the radius of the scleral curve and the correction which can be ground on the anterior surface.

F. H. Haessler.

Hecht, S. and Wald, G. **The visual acuity and intensity discrimination of Drosophila.** Jour. Gen. Physiology, 1934, March 20, p. 517.

The visual acuity and intensity discrimination of the common fruit fly, Drosophila melanogaster, was determined by observing an inherited reflex response to a moving visual pattern. The visual acuity varies with the logarithm of the light intensity. The maximum visual acuity is 1/1000 of that of the human eye. Intensity discrimination of Drosophila is also extremely poor.

John C. Long.

Hoitash, F. J. **Practical use of the stenopeic slit lens.** Arch. of Ophth., 1934, v. 12, July, p. 101.

The author advocates the use of a stenopeic slit, which is enlarged by a semicircular opening either at the center or toward the nasal side, to improve vision in eyes with opacities in the cornea or lens, or for photophobia.

J. Hewitt Judd.

Kantorovich, A. **Length of lines and interliniary distance.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 1, p. 53.

Mathematical formulae for working out this problem are given.

Ray K. Daily.

Kravkov, S. W. **The differential sensibility of an eye under the influence of a noise or of illumination of the fellow eye.** Graefe's Arch., 1934, v. 132, p. 421.

Under the influence of such an accessory stimulus the differential sensibility of the eye diminishes. With increase of the direct stimulus the effect of the accessory stimulus becomes stronger. See also the same author's findings on change in the irradiation of the eye from a noise. (Amer. Jour. Ophth., 1933, volume 16, p. 558).

H. D. Lamb.

Kravkov, S. W., and Biletzky, G. S. **The dependence of light irradiation in the eye upon intensity and contrast of the light as well as the effect of an accessory stimulus.** Graefe's Arch., 1934, v. 132, p. 379.

The irradiation increases with the brightness of the field, passing from negative to positive values. The irradiation follows the same law with black as with gray backgrounds. The amount of irradiation is less with a lighting up of the background. The change in the irradiation effect under the action of an accessory stimulus, such as an acoustic one, depends upon the contrast between field and background. The acoustic accessory stimulus increases the action of the visual center. The relative amount of such activity added by the accessory stimulus is also dependent upon the strength of the direct stimulus; growing with increase of the latter.

H. D. Lamb.

Ostwalt, F. **New lenses of punctual images.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, Aug., pp. 401-410. (See Amer. Jour. Ophth., 1934, v. 17, Oct., p. 976) R. Castroviejo.

Pascal, J. I. **Visual and orthoptic training.** Amer. Jour. Ophth., 1934, v. 17, Sept., pp. 801-806.

Possenti, G. **The effect of acetylcholine in emmetropia, in ametropia, and in aphakia.** Ann. di Ottal., 1934, 62, July, 529.

Acetylcholine, discovered by Mayer in 1914, was introduced into ocular therapeutics by Villaret and Besançon in 1926, as a remedy for arteritis of the central retinal artery. To determine whether it affected acuity of vision the author used it in the conjunctival sac of emmetropes, ametropes, and aphakics before and after accurately testing the refraction and employing skiascopy and after producing complete dilatation of the pupil and relaxation of accommodation by atropine. Acuity of vision was sensibly increased in myopes and hyperopes. There was a lowering of refraction in the myopes, and an increase in the hyperopes. The author believes that the accommodation was affected especially through the muscle of Brücke. Park Lewis.

Stekel, W. **Psychogenetic disturbances of vision.** Arch. of Ophth., 1934, v. 12, July, pp. 38-44.

Many interesting cases are presented to illustrate the author's thesis that "one sees what one wants to see, and overlooks what one does not want to see." Inner emotions determine our perception of the world. Psychoanalysis may correct visual disturbances when organic causes can not be found.

J. Hewitt Judd.

4. OCULAR MOVEMENTS

Alvaro, M. E. **Results obtained with myocampsis in the treatment of strabismus.** Rev. de Ophth. de São Paulo, 1934, v. 3, June, pp. 236-243.

Myocampsis is a special technique for shortening an ocular muscle with an apparatus attributed to Barraquer. Thirteen cases are briefly described.

W. H. Crisp.

Appleman, L. F. **Muscle training in functional convergence insufficiencies.** Arch. of Ophth., 1934, v. 11, June, pp. 950-955.

The author describes his method for increasing convergence power by exercising with base-out prisms, which are gradually increased at weekly periods. Two cases are reported to show the great benefit to be derived from this procedure in asthenopia not relieved by correction of the refractive error and the vertical muscle imbalance.

J. Hewitt Judd.

Couch, F. H. and Fox, J. C. **Photographic study of ocular movements in mental disease.** Arch. Neurol. and Psychiatry, 1934, v. 31, March, p. 556.

Photographs of the horizontal deviations of the eyes were made in 117 cases of mental illness. The Dodge mirror recorder was used to measure the deviations in pursuit of a moving pendulum, optokinetic nystagmus, response to command, and response to peripheral retinal stimuli. A wide variety of mental diseases was represented by the patients studied. In sixteen patients the ocular movements were normal. In sixty patients the response was normal except for disorders of attention. The remaining forty-one patients exhibited evidence of defect or of inadequate adjustment. There was marked variation in the responses at different times, and in different individuals suffering from varying degrees of mental illness. However, disorders in ocular adaptation represent, in part at least, the general behavior of the patient.

John C. Long.

Gallenga, R. **The phenomenon of Roasenda in peripheral facial paralysis. (Convergence insufficiency.)** Rassegna Ital. d'Ottal., 1934, v. 3, May-June, p. 451.

Gallenga disagrees with the generally accepted explanation of the unilateral convergence insufficiency which is sometimes seen in Bell's palsy of peripheral origin. He points out that the muscle of Duverney-Horner has a double innervation, from the oculomotor and from the facial. Since this muscle is attached to the medial rectus it aids in convergence. When the facial branch to the accessory muscle is affected, there results imperfect functioning of convergence, and the appearance of unilateral insufficiency. This, rather than an affection of the medial rectus, is held to be the cause of the syndrome.

Eugene M. Blake.

Greenfield, S. D. **Etiology and pathology of paralysis of the abducens nerve associated with sinus thrombophlebitis.** Arch. of Otolaryng., 1934, v. 19, March, p. 336.

The abducens nerves are in close proximity to the superior and inferior petrosal sinuses and in that area are close to each other. Thrombosis of the lateral sinus or jugular vein will produce marked congestion of the petrosal sinuses and edema of the surrounding tissues. If the thrombosis extends into the petrosal sinuses the congestion and edema will be intensified by an extension of the inflammatory process from the sinus. Marked edema of the dura surrounding the abducens nerves may result in paralysis of one or both nerves. Greenfield reports a case of bilateral abducens paralysis complicating lateral sinus and jugular vein thrombosis. The paralysis slowly dis-

appeared after resection of the jugular vein and exploration of the lateral sinus.

John C. Long.

Hosford, G. N., and Hicks, A. M. **O'Connor cinch shortening operation for heterotropia and heterophoria; a critical survey.** Trans. Sec. on Ophth., Amer. Med. Assoc., 1933, pp. 202-217; also Arch. of Ophth., 1934, v. 11, May, p. 814.

The history of the development of the operation and the present technique are presented. The author's special needle and transfer forceps are described. The use of central partial tenotomy of the opposing muscle is advocated when a greater effect is desired. The postoperative reactions may be prevented by avoiding mechanical, chemical, thermal, and bacterial trauma as much as possible. (Discussion.) J. Hewitt Judd.

Lagrange, Henri. **Principles in technique in tendon advancement.** Ann. d'Ocul., 1934, v. 171, July, pp. 587-596.

A new advancement operation is detailed. The tendon is tucked and then the anterior limb of the tuck (the tendon insertion) is cut free from the sclera and flattened forward to form additional scleral attachment. A stronger attachment is claimed.

H. Rommel Hildreth.

Ohm, J. **Contribution to nystagmus. Communication 36, relations existing between congenital nystagmus and the halves of the visual field.** Graefe's Arch., 1934, v. 132, p. 372.

In congenital nystagmus the right as well as the left visual cortex is connected with jerking of the eyes toward the right, but the connection is more intimate with the right cortex. The route of the reflex proceeds from the visual cortex in the descending optic radiations to the vestibular nucleus, affecting the ocular muscles.

H. D. Lamb.

Pugh, M. A. **A classification of cases of concomitant strabismus based on the etiological factor.** Brit. Jour. Ophth., 1934, v. 18, Aug., p. 446.

The 500 cases showed: refraction error sixty-two percent; fusion defect fifteen percent; psychologic squint twenty-one percent; physical defect squint two percent. Physical defect squints are those in which the squinting eye is irrevocably amblyopic. The author calls special attention to psychologic squints. The patients are often emmetropic. Of 103 cases, ten percent were termed jealousy squints, twenty-six percent fear or shock squints, twenty-eight percent difficult children (left-handed and self-willed types), and twenty-nine percent had psychoneurotic parents. D. F. Harbridge.

Subileau, J. M. **The myocampter for strabismus operations.** Ann. d'Ocul., 1934, v. 171, June, pp. 507-514.

This ingenious instrument is a modified muscle-tucking clamp, the feet of which are spread moderately apart. The tendon is grasped through the intact conjunctiva and a hook from the myocampter passes between muscle and sclera. After drawing up the tuck to the desired amount a metal clep with teeth is clamped into the tuck by bringing the myocampter feet together. The operation is recommended for correcting low degrees of deviation.

H. Rommel Hildreth.

Tait, C. B. V. **Ophthalmoplegia associated with bony changes in the region of the spenoidal fissure.** Brit. Jour. Ophth., 1934, v. 18, Sept., p. 532.

A girl aged seventeen years had a sharp pain in the region of the right eye. Within two weeks she had semidilated pupil, and complete paralysis of all extraocular muscles. The fundi were normal. Ten days later the left eye became similarly involved. X-ray showed extensive erosion in the region of the sphenoid sinus, with destruction of the clinoid processes. The Wassermann was negative. Twenty-four applications of x-ray resulted in prompt relief of pain and gradual return of function. Four years and six months later the patient was in good health with complete recovery except for some residual weakness of the external rectus.

D. F. Harbridge.

Thomas, A., Schaeffer, H., and Bertrand, I. **Paralysis of depression. Hypertonus of elevation and of lid levators.** Rev. Oto-Neuro-Oft., 1934, v. 9, May, p. 147.

Paralysis of reflex and voluntary depression presented itself in a male of fifty-seven years after left hemiparesis of forty-eight hours' duration, which left in its wake only a slight central facial weakness. The head was flexed, the upper lids markedly retracted, the forehead wrinkled, and the globes in divergence. The paralysis lasted until death nine months later from carcinoma of the pylorus. Autopsy revealed bilateral lesions in the tegmentum between the aqueduct of Sylvius and the two red nuclei, involvement of the posterior longitudinal bundle, but intact third nerve nuclei. There was also a small lesion in the right thalamus causing a break in the bundle of Vicq d'Azyr. M. Davidson.

Wilson, G. C. **The Marcus Gunn syndrome: Report of a case.** U. S. Naval Med. Bull., 1934, v. 22, April, p. 200.

The Marcus Gunn syndrome is the result of an abnormal relation between the nerve supply of the levator palpebrae superioris and the motor portion of the trigeminus. Over one hundred cases have been reported, most of them showing unilateral ptosis, squint, and jaw winking. Wilson reports a case in a boy of nine years that had presented this condition since birth. There was complete left ptosis except when the mouth was open, and opening of the eye was always associated with opening of the mouth. This condition was especially noticeable while eating. There was also paresis of the left superior rectus.
John C. Long.

5. CONJUNCTIVA

Alger, L. J. **Tuberculosis of the conjunctiva.** Jour. Lancet, 1934, v. 54, Feb., p. 83.

A case of tuberculosis of the conjunctiva in a woman of sixty-eight years is reported. Itching and smarting of both eyes with crust formation at night were of ten months duration in one eye and two months in the other. Examination showed a granular folliculitis with a granulating tumor on the left lower lid. The tumor was excised and a pathological report of tuberculosis was received. Treatment consisted of ultraviolet applications to closed lids in addition to cauterization of the granulations and the use of zinc sulphate solution. Both eyes appeared normal in about six weeks. John C. Long.

Angius, T. **The natural immunity of the conjunctiva of guinea-pigs to the pneumococcus.** Rassegna Ital. d'Ottal., 1934, v. 3, May-June, p. 444.

By lowering the general vitality Angius attempted to determine whether he could overcome the natural immunity of the guinea-pig conjunctiva to the pneumococcus. Repeated injection of trypan blue, fasting, refrigeration, and avitaminosis resulted in loss of weight and changes in the skin but no susceptibility of the conjunctiva to inoculation with the pneumococcus.
Eugene M. Blake.

Baumann, Frieda. **Essential shrinkage of the conjunctiva with involvement of the mucous membranes of the nose, throat, and larynx, and stenosis of the esophagus.** Med. Clin. North America, 1933, v. 17, p. 795.

A case of ocular pemphigus is reported in a woman of sixty-one years. Shrinkage of the conjunctiva was marked with practically complete symblepharon, ankyloblepharon, and trichiasis. Previously bullous formations on the bulbar conjunctiva had been noted. In addition to the ocular findings there was atrophy and ulceration of the mucous membranes of the nose, throat, and larynx. A stricture of the esophagus was present. There is no specific treatment of the disease. The general condition of the patient improved under elaborate treatment, largely dietary. There was no improvement in the local manifestations.
John C. Long.

Canitano, Saverio. **Sterilization of the eye relative to agents of suppuration.** Lettura Oft., 1934, v. 11, April, p. 196.

Representative cases of various forms of conjunctivitis, whose bacteria were either staphylococcus alone or mixed with pneumococcus or streptococcus, were treated with a commercial product "Oftalmolimas," either in ointment or as a collyrium. F. M. Crage.

Cattaneo, D. **Hyperplastic forms of the trachomatous conjunctiva.** Rassegna Ital. d'Ottal., 1934, v. 3, May-June, p. 325.

Ten cases of tumor-like hyperplasia of the conjunctiva of trachomatous patients are presented in detail, with the histologic changes. According to the latter, four definite types are recognizable: (1) hyperplasia of the plasma cell type, (2) hyperplasia of lymph cells, (3) a histoblastic type—reticulo-endothelial, and (4) a fibrous type. The literature is reviewed and the nature and genesis of such processes are discussed. (Eighteen figures.)

Eugene M. Blake.

Cornet, Emmanuel. **A new local treatment for ocular xerosis.** Ann. d'Ocul., 1934, v. 171, June, pp. 484-495.

The paper reports the results of twenty-one cases of zerosis using the author's new method of treatment. Beside the customary diet the author injects under the conjunctiva every two to five hours freshly boiled milk. Cod-liver oil or olive oil is instilled into the conjunctival sac, as well as argyrol and atropine. H. Rommel Hildreth.

Cunha, Moacir. **Trachoma. Classification of MacCallan.** Arquivos do Instituto Penido Burnier, 1934, v. 3, March, pp. 73-77.

This is a discussion in Portuguese of MacCallan's classification of trachoma. The author does not favor the slight modifications made by Cuénod and Nataf and by Rowland. W. H. Crisp.

Derkac, V. **Stubborn tissue infiltrations in trachoma.** Klin. M. f. Augenh., 1934, v. 92, June, p. 791.

In the last eight years, the author observed twenty cases of a clinical variety of trachoma which probably differs from the usual picture only quantitatively, yet is definitely recognizable. Its distinguishing characteristic is an almost tumorlike thickening of the upper lid, chiefly in the region of the upper fornix. From two such patients the author was able to get tissue for histological examination. F. H. Haessler.

Favaloro, G. **Recent researches relative to contagiousness, immunity, and reinfection in trachoma.** Rassegna Ital. d'Ottal., v. 3, May-June, 1934, p. 369.

Favaloro reviews the knowledge and experiences of others regarding contagion, immunity, and reinfection in trachoma and adds cases to support his beliefs. He concludes that, with some reservations, there exists a real regional, congenital immunity toward trachoma and that this immunity is probably more widespread than is generally believed. There is also an acquired immunity to reinfection. Both immunity and contagiousness are perhaps linked to the question of attenuation of the virus. Eugene M. Blake.

Ferrari, A. **Epithelial xerosis of the tarsal conjunctiva.** Arch. di Ottal., 1934, v. 41, March, p. 116.

Smears and cultures from the affected areas showed B. xerosis, staphylococci, diplobacilli, and intracellular diplobacilli. Inoculation of rabbit eyes gave negative results, and bacterial infection is excluded as the cause of the condition. Constitutional and local conditions are considered as etiologic factors. Histologic examination verified the reports of other authors. (Photomicrographs.) Herman D. Scarney.

Mishoolina, A. **Histopathologic changes in the transplant after Denig's operation.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 498.

The author reports three cases of Denig's operation in which after twelve to eighteen months the transplant was excised because of inflammatory changes. Histologic examination showed that the transplant can take on the characteristics of ocular conjunctiva and can become involved by the trachomatous process. Ray K. Daily.

Morax, V. **The rôle of the gonococcus in the purulent ophthalmitis of tropical countries.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, July, pp. 345-349.

In some tropical countries there are seasonal exacerbations of epidemics of gonorrheal ophthalmitis. In Egypt this exacerbation begins in July, increases during August and September, and decreases in October. During this period transmission of the disease seems to be effected from eye to eye, without intermediary genital infection. The exacerbation does not occur in gonorrheal infections of different localization, such as urethritis and vulvovaginitis. Morax stresses the prophylactic importance of isolating children affected with purulent ophthalmitis. R. Castroviejo.

Pflimlin and Rintelen. **Contributions to knowledge of the Parinaud symptom-complex.** Schweiz. med. Woch., 1934, no. 34, Aug., p. 795.

After reviewing the literature on Parinaud's conjunctivitis, the authors present the case of a four-year-old girl who appeared at the clinic three weeks after injuring her left eye with a piece of cardboard. With applications of heat the swelling of the lid became worse. After several days, the lower lid showed a folded area 8 by 5 mm., hard, grayish red. Biopsy showed spindle-shaped cells and led to a diagnosis of sarcoma superimposed upon chronic inflammation. Because the diagnosis was not absolutely sure, only the affected conjunctiva was removed. Several months later the child reappeared with the granulomatous lesion and a definite hardness of the preauricular gland on the same side. There was no new tissue at the site of the previous biopsy. Bacteriologically and histologically the tissue showed changes typical of Parinaud's conjunctivitis, the exciting agent being the pseudotuberculosis bacillus of Pfeiffer. T. M. Shapira.

Renedo, Y. M., and Ros Gonzalvez, F. **Primary lues of the bulbar conjunctiva.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, May, pp. 249-257.

Inoculation took place through an infected handkerchief used to remove a foreign body from the eye. The condition was cured without sequelae with antiluetic treatment. (Photomicrographs, bibliography.)

R. Castroviejo.

Thygeson, Phillips. **Biomicroscopy of the limbus corneae in trachoma and other conjunctival diseases.** Amer. Jour. Ophth., 1934, v. 17, Sept., pp. 787-796.

Wasserman, I. **Unilateral endemic trachoma.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 484.

The author believes that unilateral trachoma in families affected with the disease can be attributed only to immunity of the uninvolved conjunctiva.

Ray K. Daily.

6. CORNEA AND SCLERA

Castroviejo, Ramon. **Keratoplasty.** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 932-943.

Dessoff, Joseph. **Blue sclerotics, fragile bones, and deafness.** Arch. of Ophth., 1934, v. 12, July, pp. 60-71.

The author summarizes the clinical features of the cases found in the literature and reports the case of a girl aged seventeen years who presented this syndrome with keratoiritis and keratoconus in the left eye and slight, but definite, megalocornea without glaucoma in both eyes. There was no familial history of blue sclerotics. The theories of etiology are reviewed, pointing out the strong possibility of hyperparathyroidism. The activity of these glands can be successfully decreased by roentgen irradiation of the cervical region. (Color illustration.)

J. Hewitt Judd.

Eber, C. T. **Fistula at limbus (scleromalacia perforans).** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 921-923.

Hallum, A. V. **Involvement of the cornea in arsenic poisoning.** Arch. of Ophth., 1934, v. 12, July, pp. 93-99.

A colored boy of seven years developed typical symptoms of acute arsenic poisoning after eating fruit recently sprayed with an insecticide. He had a marked exfoliative dermatitis with sec-

ondary infection, involving the skin of all parts of the body, the mucous membrane of the mouth, and the conjunctiva. Corneal ulcers developed in both eyes, with perforation of the left. Treatment was symptomatic and sodium thiosulphate intravenously. The left globe became shrunken and was enucleated. A large conjunctival cyst arising from the left lower cul-de-sac was removed. The cornea of the right eye was gray and lusterless, and the epithelium irregular and opaque. Optical iridectomy did not improve vision. The histologic findings in the enucleated eye are reported. The author regards the corneal changes as due to actual toxic degeneration and exfoliation involving the corneal epithelium. Attention is called to the fact that congestion in the conjunctiva is usually the first symptom of arsenic poisoning. (Photographs and photomicrographs.)

J. Hewitt Judd.

Hesse, Robert. **On the morbid anatomy of scleritis.** Zeit. f. Augenh., 1934, v. 83, July, p. 325.

Hesse describes histological preparations from an eye removed from a woman of sixty-seven years who had severe arthritic deformities. Clinically, the disease might be classified with scleritis anterior as described by Schieck in the Kurzes Handbuch. Tuberculosis and syphilis cannot be ruled out because modern diagnostic means were not exhausted in this case. The association of episcleritis and arthritis deformans has recently been mentioned by Rochet.

Large portions of the sclera from cornea to equator and a few millimeters beyond were involved, as were ciliary body and choroid. The iris for the most part was normal and in the cornea only a few vessels had proliferated slightly into the deeper layers here and there. Necrotic and regressive changes were striking. Tuberculosis seemed the most likely etiology.

F. H. Haessler.

Höhr Castan, Y. M. **Syringomyelia and keratitis neuroparalytica.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, Aug., pp. 419-431.

The author reports a case of cervical syringomyelia complicated with neuroparalytic keratitis in the right eye. The etiology and pathogenesis of the eye condition are briefly discussed. The author states that the syringomyelia brought about the paralysis of the sympathetic of the right side, and that this originated pronounced vasomotor and trophic changes which were the etiologic factors of the neuroparalytic keratitis.

R. Castroviejo.

Julianelle, L. A., and Lamb, H. D. **Studies on vascularization of the cornea. 5. Histological changes accompanying corneal hypersensitiveness.** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 916-921.

Kraupa, Ernst. **Late glaucoma after keratitis parenchymatosa.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 43. (See Section 8, Glaucoma and ocular tension.)

Salzmann, Maximilian. **Keratitis nummularis Dimmer.** Graefe's Arch., 1934, v. 132, p. 399.

In an exhaustive review of 88 cases of his own as well as 34 from the literature, the author presents the characteristic factors in this condition. The ages of the patients generally lay between 15 and 45 years, with the maximum in the interval between 16 and 25 years. The onset of the disease was usually in the latter half of the year, with the maximum in September. Among 87 of the author's patients 52 were males and 35 females. Practically all the cases were unilateral. In general, the foci were larger than in superficial punctate keratitis, and in cases with a few foci they attained 2 to 3 mm. in diameter. A group of single foci were usually enclosed in an areolar-like, more delicate opacity. Larger foci may be produced by the coalescence of adjacent foci, and these complex opacities may greatly resemble disciform keratitis. The foci may occur anywhere in the cornea. A characteristic change is a sinking-in of the surface over the primary infiltration in the superficial layers of the corneal stroma,

with later flattening or facet-formation. The disorder may be related to herpes simplex. H. D. Lamb.

Shevchook, I. **Trephining of the cornea in treatment of serpiginous ulcer.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 454.

The author reports ten cases of trephining in the center of the ulcer, with nine successful results. The earlier the trephining and the more marked and prolonged the hypotony the better and more certain is the therapeutic effect.
Ray K. Daily.

Vogt, A. **Another keratoconus family tree (in cousins germaine).** Zeit f. Augenh., 1934, v. 84, Aug., p. 20.

Vogt observed keratoconus in two young women who were granddaughter and great-granddaughter of one pair of ancestors. He points out that similar family trees are recorded in his atlas and in the books of Waardenburg and Francescetti. F. H. Haessler.

Vogt, A. **New histological findings in cornea guttata.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 21.

By means of photomicrographs Vogt demonstrates the histologic picture of corneae which during life presented the typical picture described, and pictured in his Atlas as cornea guttata. The clinical appearance is produced by wart-like excrescences of Descemet's membrane which may exceed Descemet's membrane itself in thickness. The endothelial cells may be absent or atrophic over the excrescences. Cornea guttata may materially reduce visual acuity, even when the condition has not developed to the stage of Fuchs' epithelial dystrophy. F. H. Haessler.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Garcia Miranda, A. **Intraocular autohemotherapy in tuberculosis of the anterior segment of the eye.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, July, pp. 349-377.

The author reports late results in twenty cases of tuberculous iridocyclitis treated in Schieck's clinic at the University of Würzburg. The treatment consisted in injection of about 0.1 c. c. of blood into the anterior chamber after withdrawal of the aqueous. The blood was obtained from the patient's arm. In every case the inflammatory symptoms disappeared rapidly and in most the vision improved considerably. In seventeen cases only one injection was necessary, in two cases two, and in one case four. (Bibliography.)
R. Castroviejo.

Hartshorne, Isaac. **A case of choroidal atrophy without night blindness.** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 945-948.

Kovarskaia, C. **The etiology and clinical course of juvenile macular exudative choroiditis.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 1, p. 45.

Four cases are reported. The author interprets the etiology as tuberculosis. All four patients had evidence of former tuberculosis in the bronchial glands, and two had a positive Mantoux reaction. Ray K. Daily.

Krause, A. C. **Chemical composition of the mucoid and gelatin of the choroid and iris.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, June, pp. 297-302.

The author gives results of his analysis of the proteins and the amount of amino-acids of the choroid and iris. The method of Van Slyke and colorimetric analysis were used for this investigation. (Bibliography.)
R. Castroviejo.

L'Eltore, G. P. **On tuberculosis conglomerata of the uveal tract.** Ann. di Ottal., 1934, v. 62, Sept., p. 779.

Following Lagrange's classification of conglomerate tuberculosis under two types, that involving the iris and ciliary body and that affecting the choroid, the author reports cases illustrating the clinical manifestations and pathology of each type. In the tuberculoma of the anterior uveal tract the infection developed in the stroma at the base of the iris, extended through the iris and the ciliary processes, coincidentally traversed the pectinate ligament and the canal of Schlemm, and invaded the

sclerocorneal limbus and adjacent structures. The special structure and sluggish course of such a tuberculoma, together with the general examination of the patient, tends to show it as a superinfection from a silent center. (Bibliography.) Park Lewis.

Llorca, P. **Telangiectatic form of sympathetic ophthalmia.** Arch. de Oft. Hisp.-Amer., 1934, v. 34, June, pp. 302-315.

The histological findings of typical cases of sympathetic ophthalmia are outlined, with special reference to Fuchs' description of this disease. The author observed an atypical case which developed after performing two operations on an eye with detached retina. The atypical characteristic was the presence in the choroid of new-formed dilated vessels of cavernous aspect. (Photomicrographs and bibliography.) R. Castroviejo.

Munson, E. S. **Chronic iritis with blood vessels on the lens.** Arch. of Ophth., 1934, v. 12, July, pp. 99-100.

A man aged forty-five years had had the left eye injured by a stone when one year old and the sight had gradually failed. The eye presented a profuse vascularization of the surface of the lens beginning in the connective tissue at the periphery of the iris, which was attached to the lens by a posterior synechia. J. Hewitt Judd.

Rinaldi, S. **Experimental researches on the ocular complications of the icterohemorrhagic spirochete.** Ann. di Ottal., 1934, v. 32, Sept., p. 737.

The symptoms produced by this spirochete include acute icterus with intense yellow color of the external ocular tissues, pericorneal hyperemia, turbidity of the aqueous with a deposit on Descemet's membrane, heterochromia, miosis, and pigment and crystalline deposits on the anterior lens capsule, with lowered visual acuity. The author's experiments on guinea pigs inoculated with material taken from a subject afflicted with icterohemorrhagic spirochetes (Weil's disease) confirmed the contagiousness of the human conjunctival secretions, transmission of the infection through intraocular inoculation, and ocular manifestations in animals inoculated in the abdominal cavity. (Bibliography.) Park Lewis.

Villani, G. **A histologic study of lesions of the pigmented epithelium of the iris and of the epithelium of the ciliary body in experimental diabetes.** Ann. di Ottal., 1934, v. 62, Sept., p. 763.

The author considers the ready dispersion of the pigment of the iris and ciliary body in experimental diabetes. Five rabbits were subjected to an intraperitoneal injection of glucose in varying amounts, producing a state of hyperglycemia until it resulted in the death of the animal. Microscopic examination of a single eyeball constantly showed in the epithelial strata and more particularly in the pigmented areas of the iris and ciliary body degenerative changes leading to necrosis and separation of the epithelium. (Bibliography.) Park Lewis.

8. GLAUCOMA AND OCULAR TENSION

Bolgov, P. **The effect of posterior superficial cross-sclerotomy on intraocular tension.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 444.

This operation was proposed by Vicherkevich on the hypothesis that the intraocular tension is higher in the posterior segment of the eyeball, because there the sclera is most dense and inelastic. The posterior portion of the eyeball is exposed through a conjunctical incision half way between the external and superior recti. With a Graefe knife five to seven parallel incisions, 9 to 12 mm. in length, are made superficially in the sclera, not exposing the choroid; and another set of incisions is made at a right angle with the first set. This diminishes the scleral rigidity. The author reports in detail the results of nineteen operations in the various types of glaucoma. The operation, while harmless, has only a moderate and transitory effect on intraocular tension, and therefore can serve only as a preliminary procedure. Ray K. Daily.

Courtis, B. **The pathologic anatomy of the angle, iris, and ciliary body in glaucoma.** Arch. de Oft. de Buenos Aires, 1934, v. 9, Feb.-March, p. 59. The subject is reviewed and illustrated with photomicrographs. M. Davidson.

Kirwan, E. W. O'G. **Primary glaucoma, a symptom complex of epidemic dropsy.** Arch. of Ophth., 1934, v. 12, July, pp. 1-20.

This report is based on 325 cases of glaucoma associated with epidemic dropsy seen during the epidemics of 1929-30 and 1932-33 in India. The disease is caused by toxins of the histamin group formed in rice. These circulate in the blood, disturb the function of the capillary endothelium, and produce telangiectatic dilatation of the capillaries. The glaucoma is only a part of the generalized disorder and belongs to the chronic, primary, noninflammatory type. The treatment is symptomatic but usually operative to prevent permanent damage until the general disease has been cured by elimination of the offending toxins. Twelve cases, with perimetric charts, are reported in detail to illustrate varying degrees of severity. One case indicates that the optic atrophy is due to the increased tension and not to the toxins.

J. Hewitt Judd.

Kraupa, Ernst. **Late glaucoma after keratitis parenchymatosa.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 43.

In the course of syphilitic keratitis, increased intraocular tension is not unusual, but often disappears without treatment or after paracentesis of the anterior chamber. Kraupa reports three instances of rise of tension decades after complete healing of the inflammation. Endothelial damage may be a local cause of glaucoma, and glaucoma is also known to occur years after the healing of herpes. The condition of the capillaries of syphilitics points to a severe angiopathy which may prepare the way for glaucoma. In the author's three patients, medical treatment was of no avail. He performed iridectomy, Elliot's trephining, and cyclodialysis as primary operations, and where the tension did not remain normal he added one or more further cyclodialyses before normal tension became permanently established. F. H. Haessler.

Pesme, Paul. **A case of hydrocephalus with infantile glaucoma.** Arch. d'Opht., 1934, v. 51, Aug., p. 524.

An infant had congenital hydrocephalus due to absence of the ependymal canal, and also had bilateral infantile glaucoma. Anatomical examination of the eyes showed a fully developed canal of Schlemm and obliteration of the iris angle by pressure forward of the lens and an enlarged ciliary body. The possible etiological relationship between the cerebral and ocular conditions is discussed.

M. F. Weymann.

Rachevskii, F. **An attempt at ultrafiltration of the aqueous humor through the cornea of the living eye.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 465.

In colloidal chemistry, ultrafiltration signifies filtration under increased pressure through a semipermeable membrane. Because of its avascularity, the cornea, while more complex in structure than a colloidal membrane, comes closer to it than any other living tissue. An ultrafiltrate from any other tissue would contain some fluid from the bloodvessels and lymphatics in addition to the forced fluid. The living cornea of a guinea pig was subjected to increased intraocular pressure by fitting over it a tube connected with an exhaust pump above and a collecting vessel below. The exhaust pump created a vacuum and the intraocular pressure forced the aqueous through the cornea. The experiment demonstrated that the cornea tolerates pressure thirty to forty times normal. Prolonged hypotony following the procedure suggested that it had a prolonged effect on the metabolism of the eye. Ray K. Daily.

Samoilov, A. **Modification of the conjunctival flap in the Elliot operation.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 1, p. 66.

A horizontal incision of the conjunctiva instead of one concentric with the

limbus holds the flap in position and eliminates the need for sutures. Making the flap very superficial at first and deepening it only at the limbus avoids injury to the ciliary blood vessels and annoying hemorrhage.

Ray K. Daily.

Schmelzer, Hans. **Increase of intraocular tension after diocain and the best anesthetic for tonometry.** Zeit. f. Augenh., 1934, v. 83, July, p. 331.

Recently the author noted acute attacks in two cases of compensated glaucoma after instillation of diocain in 0.3 percent solution. He ascribes the accident to the mydriasis which diocain produces. On the basis of statements in the recent literature and of his own experience, he recommends a one percent solution of pantocain as best for tonometry. F. H. Haessler.

Soloviev, L. **Posterior sclerectomy in absolute glaucoma.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 1, p. 21.

The author urges posterior sclerectomy as a substitute for enucleation in all cases of painful absolute glaucoma. He trephines in the region of the equator, and if necessary repeats the operation several times.

Ray K. Daily.

Starodoobzeva, A. **The use of gravidan in glaucoma.** Sovietskii Viestnik Opht., 1934, v. 5, pt. 1, p. 30.

The author used injections of gravidan (the urine of pregnant women, prepared so that its chemical composition, qualitatively as well as quantitatively, remains unchanged) in thirty-three cases of glaucoma. Gravidan was harmless, although occasionally it produced a transitory nervous irritability. It had a general tonic effect, regulated the general blood pressure, in many cases lowered intraocular tension, relieved pain, counteracted inflammation, and had a tonic effect on the eye. (Photographs of tension charts and visual fields.) Ray K. Daily.

Uribe Troncoso, M., and Reese, A. B. **Gonioscopic findings after the Elliot operation.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 366.

Gonioscopic examinations were made in twenty-two patients after trephine operations by expert surgeons. Of the twenty-nine eyes examined normal healing was found in only three, while there were incarcerated ciliary processes in twelve eyes, incarcerated iris in seven, and incarceration of both in one eye. Exudation in the angle with adhesion to the ciliary body or sclera or to both was found in six eyes, and marked postoperative iritis with posterior synechia was present in seven cases. The authors feel that the breadth of the peripheral synechiae determines whether the trephining is carried into the anterior or the posterior chamber.

Beulah Cushman.

Van Heuven, J. A. **Some remarks on pilocarpin.** Brit. Jour. Ophth., 1934, v. 18, Sept., p. 511.

Certain chronic glaucoma patients, using pilocarpin, suffered diminished vision. The lowered vision lasted, with a two percent solution, about one and a half hours. The author formerly believed this due to the narrow pupil and to incipient lens opacities. But his investigations suggest that it is caused by a spasm of the capillaries in the region of the fovea centralis. This phenomenon is confirmed by using the entoptoscope of Scheerer. When one gives at the same time small doses of nitroglycerin by mouth, the hypotensive action of the pilocarpin remains, but the relative central scotoma disappears. The same effect may be obtained by using a mixture of pilocarpin one percent, eserin 0.3 percent, and cocaine 0.5 percent.

D. F. Harbridge.

9. CRYSTALLINE LENS

Caughey, J. E. **Cataract in dystrophia myotonica.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 60.

The author reviews the literature to date and reports four cases in which there were in the lens many tiny iridescent angular opacities of variable size, located in the band beneath the disjunction zone anteriorly and posteriorly. Associated were clinical findings of muscle wasting, absent deep reflexes, myotonia, and dystrophy symptoms. In

one case hypertrophic myotony was present. Beulah Cushman.

Chance, Burton. **Conservative treatment of massive cystoid following cataract extraction.** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 929-931.

Disler, H. **The technique of intracapsular cataract extraction.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 441.

The author believes that tumbling the lens merely complicates what is otherwise a simple procedure. He extracts the lens by traction and pressure, upper border first. Any blunt forceps will grasp the capsule. (Illustrations.)

Ray K. Daily.

Greeves, R. A. **A conjunctival suture inserted before section in certain cases of cataract extraction.** Trans. Ophth. Soc. United Kingdom, v. 1933, v. 53, p. 86.

The author recommends the use of a number 0 silk continuous suture introduced into the conjunctiva parallel to the cornea, one stitch about 3 mm. and the other 8 to 9 mm. above the limbus, the loop to be placed nasally. The corneal section is then made, the knife coming out between the two stitches. The knot is tied immediately after extraction of the lens.

Beulah Cushman.

Kalt, M. E. **My procedure for senile cataract extraction.** Ann. d'Ocul., 1934, v. 171, Aug., pp. 652-660.

This paper is a review of the Kalt intracapsular technique and is not satisfactory for abstract form. It considers the corneal suture, peripheral iridectomy, actual lens extraction, preliminaries to operation, and postoperative results. H. Rommel Hildreth.

Milner, J. G. **Irradiation cataract.** Brit. Jour. Ophth., 1934, v. 18, Sept., p. 498.

This contribution reviews thirty-six cases. The author concludes that exposure of the eye to x-rays or radium is likely to result in the formation of cataract, the characteristics of which are the formation of vacuoles, cloudy areas, and later a plaque, all situated in the posterior cortex. The latent period between exposure and cataract formation is at least two years. Of radium the beta rays, applied at short intervals for short periods, are effective in treatment and harmless to the lens, but the gamma rays are likely to produce cataract.

D. E. Harbridge.

O'Brien, C. S., Molsberry, J. M., and Allen, J. H. **Diabetic cataract, incidence and morphology in 126 young diabetic patients.** Jour. Amer. Med. Assoc., 1934, v. 103, Sept. 22, p. 892.

In a study of the crystalline lenses of 126 young diabetic patients, aged from two to thirty-three years, the incidence of cataract was sixteen percent. Two common types of lens change occurred:

(1) Snowflake or snowstorm cataract, found in sixty percent of the cases and appearing as innumerable small grayish-white flaky opacities in the anterior and posterior cortical areas. In a routine study of several hundred cataracts it was seen, with one exception, only in persons with diabetes.

(2) Posterior subcapsular cataract, found in seventy percent of the cases as a saucerlike posterior subcapsular opacity composed of confluent gray granules and oftentimes iridescent crystals. It is not peculiar to diabetic cataract, since similar changes may follow ocular injury or disease, and it has been noted in senile cataract. (Four figures and discussion.)

George H. Stine.

Pereira, R. F. **Ocular hypertension from vitreous prolapse after discission.** Arch. de Oft. de Buenos Aires, 1934, v. 9, April, p. 115.

A two-needle discission of after cataract from penetrating injury in a young man gave rise to an irreducible large vitreous prolapse with repeated attacks of hypertension. Atropin and cyclodialysis were without avail, but temporal iris transfixion finally gave relief. The conclusions drawn are that the vitreous is impermeable to aqueous humor, and that an ample iridectomy should accompany all extractions where the cystotome alone is employed and in

which a dense after cataract necessitating discission is therefore likely to result. M. Davidson.

Russo, A. **The genito-sclerodermic syndrome and cataract.** Ann. di Ottal., 1934, v. 62, Aug., p. 646.

After expounding the clinical picture of the morbid association of scleroderma and cataract which is known as "Rothmund's disease," the author describes the thirty-first case in the literature. The pathological changes in the skin and crystalline lens arise from the alteration in calcium metabolism. In the author's case the cataract probably began in the posterior cortical layers.

Interference with the nutrition of the eye through angiospasm of the ciliary vessels relates the condition to Raynaud's disease. There was latent tetanus with the Chvostek and Erb signs, hypogenitalism, gynecomastia, and hypothyroidism. (Bibliography.)

Park Lewis.

Satanowsky, P. **A rare form of juvenile cataract.** Arch. de Oft. de Buenos Aires, 1934, v. 9, June, p. 257.

A rare form of progressive punctiform club-shaped peripheral anterior and posterior cortical lens opacities with large axial anterior and posterior cortical opacities was observed in a moderate myope of twenty-five years. Because of involvement of the anterior suture, the presence of axial opacities, and freedom from involvement of the embryonic nucleus, classification either as a coronary or a punctiform or floriform cataract presents difficulties.

M. Davidson.

Souter, W. C. **Two cases of cataract extraction in myotonia atrophica** (pedigree chart). Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 73.

Two male cousins of the fourth generation were examined by the author and the cataracts were successfully removed. An interesting pedigree of four generations is included, in which five cataracts were reported and four of these had general symptoms of myotony, two of them being the cases here reported. Beulah Cushman.

Viallefont, H., and Temple, J. **Arachnodactylia or the syndrome of Marfan. Ocular disturbances, familial and hereditary character.** Arch. d'Opht., 1934, v. 51, Aug., p. 536.

The literature concerning this condition, which was first described by Marfan in 1896, is reviewed, and the author reports a family in which the father and three of five children were affected with arachnodactylia and subluxation of the lenses. M. F. Weymann.

10. RETINA AND VITREOUS

Böck, J., and Risak, E. **Retinitis pigmentosa and gigantism.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 48.

Retinitis pigmentosa was associated with a gigantism which suggested late eunuchoidism. Oliguria and retarded salt excretion pointed to a midbrain lesion. F. H. Haessler.

Giannini, D. **A contribution to the study of retinitis punctata albescens in relation to Oguchi's disease.** Ann. di Ottal., 1934, v. 62, Sept., p. 752.

In 1911, under the title of Oguchi's disease, Komoto reported a case of discoloration of the retina in every way similar to the three in which this rare condition was found by Oguchi himself. The fundus throughout its entire area or in parts was of a whitish gray of varying intensity. Careful research disclosed no pigment patches and no white spots. The papilla and the vessels were perfectly normal except that in contrast with the lighter retina they stood out in marked relief. The macula surrounded by the grayish area appeared abnormally dark and the vessels near it strongly defined. Central visual acuity was not reduced.

After an hour in absolute darkness the grayness disappeared and the normal fundus red was present, only to change again on exposure to light. The majority of the cases observed have been in Japan in the Mongolian race, and only four European cases have been reported, one in a German, two in semitics, and one in a Pole. The author describes two additional cases and concludes that retinitis punctata albescens

and Oguchi's disease are varying manifestations of a single morbid entity. (Bibliography.) Park Lewis.

Huber, E. **Retinitis punctata albescens with involvement of the foveas.** Arch. de Oft. de Buenos Aires, 1934, v. 9, June, p. 231.

A male of thirty-five years, without evidence of consanguinity or heredity, presented a central choroiditis of honeycomb form in one eye and punctate lesions in the other fovea. There was a weakly positive reaction to tuberculin. The case is assigned to the group of progressive tapetoretinal degenerations of Dimmer. Differential diagnostic points between retinitis punctata albescens and similar appearances are discussed. (Illustrations, bibliography.) M. Davidson.

Jeandelize, P., Baudot, R., and Gault, A. **Treatment of detachment of the retina without visible tears or with uncertain tears by diathermocoagulation.** Arch. d'Opht., 1934, v. 51, Aug., p. 511.

Inability to find a tear in the retina does not prove its absence, and the procedure of diathermocoagulation is recommended in all cases where no tear can be found. The most likely location of the tear is the area in which the patient first notices the defect in his field. Diagrams of the operative area in ten such patients are given. M. F. Weymann.

Knapp, Arnold. **The operative treatment of retinal detachment with electrocoagulation.** Trans. Amer. Ophth. Soc., 1933, v. 31, pp. 195-205. (See Amer. Jour. Ophth., 1934, v. 17, April, p. 376.)

Koyanagi, Y. **The origin and significance of subretinal effusion in nephritic retinitis.** Graefe's Arch., 1934, v. 132, p. 353.

The retinal detachment which occurs as a frequent and important complication of nephritic retinitis is due to primary subretinal effusion. The fluid is very rich in hyalin substance and is essentially different from ordinary transudate or exudate. This fluid takes origin not from the vascular system of the choroid or retina but chiefly from the pigment epithelium, which takes up from the circulation toxic substances to be rejected as foreign products of metabolism. In the retinal pigment epithelium of the human eye occur numerous mitochondria which indicate its secretory activity. H. D. Lamb.

Lijo Pavia, J. **Macular and paramacular degeneration.** Rev. Oto-Neuro-Oft., 1934, v. 9, Aug., p. 266.

Apropos of an annular parafoveal yellowish-green nonpigmented lesion crossed by vessels and situated deeper than the foveal plane, the writer points out that angiospasm of the capillaries determines the site of such lesions in the external plexiform layer, and thus explains the lacunar retinal degenerations accompanying them. The paper is illustrated with fundus photographs accompanied by schematic projection of the fundus planes, recommended by the writer for didactic purposes. M. Davidson.

Lijo Pavia, J., and Dusseldorp, M. **Unusual picture of hemorrhage in fundus and its evolution.** Rev. Oto-Neuro-Oft., 1934, v. 9, Aug., p. 261.

Fifty days' careful observation of the absorption of a prepapillary hemorrhage involving papilla and macula leads the writers to certain conclusions. A part of the blood collection took longer to absorb and its absorption progressed from below upward. It is presumed to have lain in a pocket formed by the internal limiting membrane and the retina. The other part became absorbed faster and progress was from above downward in accordance with the laws of gravity, so that this is assumed to have been blood that had escaped and lay between retina and vitreous. The etiology was gastrointestinal toxemia and mild arterial hypertension. (Illustrated.) M. Davidson.

Marshall, J., and Michaelson, I. C. **Exudative retinitis in childhood.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 102.

Four cases of the authors, and one from the literature in patients under the

age of five are adduced as examples of the condition described by Leber as "retinitis exudativa serofibrinosa." By this Leber probably meant a chronic retinitis with infiltration of the retina and the subretinal space by large bladderlike cells and accompanied by a fibrinous intraretinal and subretinal exudate. Coats believed the condition primarily due to hemorrhage. The authors believe it probably embolic-toxic in origin and not the result of preëxisting hemorrhage. The characteristic features of the cases were: patients all under five years; chronicity (1 to 18 months); outer layers of the retina chiefly affected; large bladderlike cells present in the retina and the subretinal space; vessels normal; no new membranes in the subretinal space; choroid normal; pigment-layer uninterrupted and normal throughout.

The authors regard these findings as constituting an entity distinct from the classical Coats disease. The large bladderlike cells are interpreted as histiocytes arising from the reticulo-endothelial system. Beulah Cushman.

Peter, L. C. **Technique of electrocoagulation in the treatment of retinal detachment.** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 924-928.

Salzmann, Maximilian. **Contributions to the congenital anomalies of the human eye.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 1.

Salzmann describes small stumps of tissue, remains of the fetal hyaloid artery, in histologic preparations from nine eyes enucleated for various causes such as injury, glaucoma, and neoplasm. In none of them had the anomaly been noted in life. The stump is usually on the nasal side of the disc and contains an inner strand of delicate, vaguely striated colloid connective tissue, surrounded by a glial mantle. The stump has no lumen. It is probable that the stump undergoes further regression in the course of extrauterine life.

In three eyes, Salzmann observed in the central retinal vein septa similar to one he briefly described in his essay on glaucoma and retinal circulation. As many as five strands of tissue lying in various planes traversed the lumen of the vein. In one eye a complete axial septum, fenestrated only at its distal end, divided the lumen of the vein into two equal parts. F. H. Haessler.

Satanowsky, P. **Retinitis pigmentosa and hepatic function.** Arch. de Oft. de Buenos Aires, 1934, v. 9, May, p. 203.

Considering that retinal purple is essential to the proper functioning of rods and possibly also of cones, that it is soluble in biliary acids and salts, that its regeneration is retarded by vitamin-A deficiency, and that this vitamin is stored in the liver, the writer concludes that retinitis pigmentosa should be regarded as caused by atrophy from disuse of rods and cones rather than from circulatory disturbances of either the choriocapillaris or retina. The close relation between hepatic disease and hemeralopia, suspected as far back as 1855 by Bamberger, is indicated by the retinal hemorrhages observed in icterus. Five cases of retinitis pigmentosa with cholelithiasis and cholecystitis in the history, here reported, have shown improvement from liver treatment. The need for further study of the blood content of biliary salts and acids in retinitis pigmentosa is advocated.

M. Davidson.

Traquair, H. M. **Spasm of the retinal artery.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 118.

The author reports two cases. One patient had suffered for twelve years from frequent attacks of sudden temporary blindness lasting from five to seven minutes, with no permanent damage. The second patient had had for thirty-nine years obscuration of vision varying from two or three to fifty-five minutes, with 34 attacks recorded between September, 1929, and December, 1932, in one eye and 43 in the other. After thirty-seven years a permanent central scotoma had remained (illustration). General examination revealed no vascular pathology.

In conclusion the two forms are summarized. The nervous type may be associated with symptoms similar to

those of migraine, begins in youth or early adult age, and is probably a form of a disease of which migraine is one manifestation. It is characteristic that the fundi present normal appearances between attacks and there are no blood vessel changes. The second type is associated with vascular disease. The patients are older and have high blood pressure, arterial disease is visible in the fundus and present elsewhere, and migrainous symptoms are absent.

The author considers the majority of cases of so-called "embolism" of the central retinal artery or one of its branches to be cases of spasm.

Beulah Cushman.

Vogt, Alfred. **Cathode electrolysis as a new way for finding and closing retinal dehiscences.** Zeit. f. Augenh., 1934, v. 83, July, p. 322.

Very frequently diathermy puncture is invisible because it is in the choroid, and there is also danger of puncturing the detached retina without cauterizing it. Cathode electrolysis has the advantage that it forms bubbles along the entire length of the cathode and even at its tip, and not only at the points of entrance in the choroid and retina as in diathermy. A conglomerate of bubbles becomes visible as a guide during the operation, an advantage afforded by no previous method. A larger needle can be used when drainage of fluid is desirable. The needles need not be sharp. Destruction of tissue is much less extensive than with cautery diathermy and chemical corrosion, since one applies at most 2 ma. for less than 0.5 second. The positive pole is placed on the eyeball and the current is closed before puncturing. To produce larger bubbles, the needle may be left for one second. Twenty-four hours later all bubbles will have disappeared. Multiple punctures through the edges of the tear and throughout its base bring about closure. An ordinary galvanic apparatus, such as is used for epilation of cilia, replaces the expensive diathermy machine. That rents can be closed in this way is beyond question. Judgment as to permanence of cure must be postponed.

F. H. Haessler.

Vogt, A. **The dangers of needle diathermy.** Zeit. f. Augenh., 1934, v. 83, July, p. 321.

The coagulation effect is a function of that part of the surface area of the noninsulated needle which is introduced and is greatest where the point emerges from air into the tissue. There is therefore danger of puncturing a detached retina without inducing the slightest coagulation, which increases the chance for further tears. Gas bubbles, easily visible, arise at the base of puncture when the needle enters the vitreous. They serve as an excellent guide. F. H. Haessler.

Vogt, A. **Healing of retinal detachment after one closure of a hole after the detachment had persisted for seven and three-quarters years.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 17.

The hole was closed with a diathermy needle. Absence of yellow color of the macula had been noted during the stage of detachment. F. H. Haessler.

Vogt, A. **Retinal opacities in light of high specific luminosity in the diagnosis of retinal detachment.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 19.

On illuminating a small patch of retina with a light of high specific luminosity, the patch seems slightly opaque if the retina is in normal contact with the choroid, but totally opaque and yellowish when the slightest detachment has taken place.

F. H. Haessler.

Walls, G. L. **The reptilian retina. 1. A new concept of visual-cell evolution.** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 892-915.

11. OPTIC NERVE AND TOXIC AMBLYOPIAS

Corrado, M. **On the pathogenesis of calcareous concretions of the papilla in relation to the process of calcinosis.** Ann. di Ottal., 1934, v. 62, Sept., p. 721.

The author describes a case. He believes the condition is closely related to the so-called metastatic calcinosis of Virchow, and that the causal feature is interference with calcium metabolism, in turn dependent upon endocrine dis-

turbance and other causes yet unknown. The case under consideration did not show hypercalcemia but was probably due to interference with calcium metabolism. The papilla appears to be the site particularly favored. (Bibliography.) Park Lewis.

Lederer, L. **Temporary amaurosis during septum anesthesia.** Zeit. f. Hals-Nasen-Ohrenh., 1934, v. 35, April, p. 260.

A septum operation was to be done in a thirty-six-year-old male. Ten percent cocaine solution with three drops of 1 to 1000 suprarenin was sprayed once in each nostril, and then tampons moist with the same solution were inserted in each nostril for five minutes. One percent novocain with five drops of suprarenin 1 to 1000 was used for injecting. The injection on the side of the deviation took place without complication. As the last 2 c. c. of this solution was injected deep in the nose on the right side, the patient complained of flashes of light in the right eye, which were followed by complete blindness in both eyes. After five seconds the left eye had only light perception. After ten minutes all objects seen with the right eye appeared tilted and there was diplopia which lasted for five minutes. There was limitation of motion in all directions. The fundi were negative. There was anemia with anesthesia in the region supplied by the frontal and supraorbital arteries. The operation was continued after a half-hour.

The symptom complex is attributed by the author to direct injection of the anesthetic into a branch of the ethmoid artery, with resulting spasm of the central artery of the retina and the frontal and supraorbital arteries. Recovery was complete. T. M. Shapira.

Pilman, H. **The effect of carbon monoxide poisoning on the visual organ.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 433.

This is a detailed report of the examinations of thirty-six men working in atmospheres containing an excess of carbon monoxide. Eight had vascular dilatation in the fundus. In most cases central vision reached only 0.8. Only two had normal visual fields, the contraction first appearing for color and later for form; and repeated examination demonstrated the progressive tendency of the visual field changes.
Ray K. Daily.

Sicharoolidze, I. **Tuberculous involvement of the optic nerves.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 506.

Five cases of tuberculous optic neuritis were treated with tuberculin, with recovery of good vision in four cases. In one case the outcome was optic atrophy. Ray K. Daily.

12. VISUAL TRACTS AND CENTERS

Dering, S. **A case of homonymous hemianopsia after typhoid fever.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 571.

A man of twenty-eight years developed a right homonymous hemianopsia following typhoid fever. His left fields were contracted for green. He had a positive Wassermann but all other examinations were negative. On treatment the left visual fields for green extended to normal, but there was no change in the hemianopsia. Because of the absence of other cerebral symptoms caused by bacterial invasion the author considers this a toxic process.
Ray K. Daily.

Keegan, J. J., and Ash, W. E. **Bilateral cavernous sinus thrombophlebitis without involvement of the ophthalmic vein.** Arch. of Ophth., 1934, v. 12, July, pp. 72-80.

A woman aged twenty-seven years developed pain in the right temporal region three days after extraction of teeth, without fever or evidence of infection. Diplopia and right ophthalmoplegia appeared three weeks later. Six weeks after onset of pain there was a low-grade fever for a week, after which signs of meningeal irritation appeared. Block of the right jugular vein was demonstrated but the symptoms subsided. Three months after the onset, symptoms recurred with delirium, intracrani-

al pressure, and some atypical signs of involvement of the left cerebral region. Death occurred two weeks later, without characteristic signs having developed. Necropsy revealed cavernous sinus thrombophlebitis, healed on the right and purulent on the left, with a meningeal abscess in the left temporal region. The primary focus was an osteomyelitis of the base of the sphenoid bone. (Diagram.)

J. Hewitt Judd.

Weekers, L. **Central positive and transitory scotoma in chronic alcoholic intoxication.** Arch. d'Opht., 1934, v. 51, Aug., p. 497.

The method of production of the positive transitory central scotoma previously described by the writer as present in retrobulbar neuritis due to alcohol and tobacco is reviewed. Morel has found that the visual hallucinations in the crisis of delirium tremens may be based upon perception of a similar positive central scotoma, which is not transitory and only disappears on sudden movement of the eyes. As this scotoma occupies a constant visual angle the larger imaginary animals seen by the patient are at a distance and the smaller ones nearby. Further study of the phenomenon is necessary to ascertain its true clinical value.

M. F. Weymann.

13. EYEBALL AND ORBIT

Corrado, A. **Orbital abscess with skin fistula following posterior ethmoiditis.** Rassegna Ital. d'Ottal., 1934, v. 3, May-June, p. 436.

A seventy-seven-year-old man presented himself with a phlegmon of the orbit which had ruptured through the skin at the lower orbital margin. A corneal opacity developed and blindness resulted from optic nerve atrophy. The x-ray showed a diffuse osteitis at the aperture of the posterior ethmoid cells. Eugene M. Blake.

Cosmettatos, G. F. **Concerning a rare form of persistent pupillary membrane with microphthalmos.** Arch. d'Opht., 1934, v. 51, Aug., p. 532.

A peculiar type of pupillary membrane extended in the form of a cone from the entire pupillary border of the iris to its insertion into the posterior surface of the cornea. The eye was blind and microphthalmic.

M. F. Weymann.

Rones, Benjamin. **The genesis of atypical ocular coloboma.** Amer. Jour. Ophth., 1934, v. 17, Oct., pp. 883-889.

Zass, P. **Left alternating exophthalmos and enopthalmos, associated with Basedow's disease and left hemiatrophy.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 480.

A woman of twenty-one years, with progressive left hemiatrophy and symptoms of Basedow's disease, had enophthalmos of the left eye when in the erect position, and exophthalmos on bending forward. The author attributes the enophthalmos to shrinking of the orbital fat, and the exophthalmos to venous hyperemia and diminished tonus of the ocular muscles.

Ray K. Daily.

14. EYELIDS AND LACRIMAL APPARATUS

Krilov, T., and Postovtzev, B. **Treatment of blepharitis with brilliant green.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 501.

Brilliant green applied to the lids two to three times daily is very effective in ulcerative blepharitis. A one-percent alcoholic solution is much more effective than an aqueous solution, apparently because of deeper penetration. One percent solutions of brilliant green and of malachite green were equally effective.

Ray K. Daily.

Lipovich, H., and Margolin, G. **A case of Gunn's syndrome.** Sovietskii Viestnik Opht., 1934, v. 4, pt. 5, p. 574.

The authors report a case of left ptosis, with elevation of the lid on opening the mouth and moving the lower jaw to the right. Ray K. Daily.

Marquez, M. **A case of atypical syndrome of Mikulicz.** Ann. d'Ocul., 1934, v. 171, Aug., pp. 641-651.

A fifty-eight-year-old man presented

massive enlargement of the lacrimal glands, with some swelling of the parotid and submaxillary glands. The lacrimal glands were dense enough to cause shadows in the x-ray films. The microscopic appearance of the lacrimal gland tissue was the unusual feature, there being no glandular elements whatever, and sections being composed solely of lymphoid tissue.

H. Rommel Hildreth.

Sena, J. A. **Autoplastic skin grafting in treatment of cicatricial ectropion.** Arch. de Oft. de Buenos Aires, 1934, v. 9, May, p. 175.

The Wolfe-Krause technique is preferred and is used at Professor Argañaraz' eye service at the University clinic. It is illustrated by five cases.

M. Davidson.

Stookey, P. F., Ferris, C. R., Parker, H. M., Scarpellino, L. A., and English, K. E. **Necrotizing ulcers complicating erysipelas** Jour. Amer. Med. Assoc., 1934, v. 103, Sept. 22, p. 903.

Three cases are reported in which severe erysipelas was complicated by necrotizing ulcers confined to the edematous, loose, areolar tissue of the eyelids. The ulcers result from a superimposed infection produced by a staphylococcus possessing the ability to manufacture an exotoxin which is dermonecrotic and hemolytic. The presence of such ulcers enhances the gravity of the prognosis. (Nine figures and two tables.) George H. Stine.

Tennent, J. N. **Carcinoma of the lacrimal sac.** Trans. Ophth. Soc. United Kingdom, 1933, v. 53, p. 93.

Primary carcinoma of the lacrimal sac in a man forty-three years of age developed as acute dacryocystitis. The abscess was opened and drained and the lacrimal sac removed three months later. The sac was hard and fibrous at the time of its removal and examination showed it to be malignant. A woman of sixty-nine years had a discharging left lacrimal sac, and a firm mass soon became palpable to the lateral side of the mucocele. A Roentgen picture showed the left antrum opaque, the growth seeming to originate from the ethmoid region. Primary carcinoma of the sac is rare but very malignant, and its possibilities should be borne in mind in cases of chronic infection.

Beulah Cushman.

Tiscornia, B. J., and Mercandino, C. P. **Internal dacryocystorhinostomy: the Halle operation.** Arch. de Oft. de Buenos Aires, 1934, v. 9, June, p. 262.

The Halle operation (establishment of a window between sac and nose) is described, recommended, and illustrated by two cases operated on.

M. Davidson.

Woronytsch, N. **Internal tarsoplasty in entropion and trichiasis secondary to trachoma.** Zeit. f. Augenh., 1934, v. 84, Aug., p. 58.

The author enthusiastically recommends this operation, which he has performed on six hundred eyelids. The end result of many of the operations used is shortening of the lid with deformity. The author makes an incision through the conjunctiva and tarsus so that the distal portion of the tarsus becomes wedge-shaped. The lid edge is then everted so that the cut edge of the distal tarsus segment comes to lie in the same plane as the posterior surface of the proximal piece. A semilunar piece of mucosa from the lip is transplanted to the denuded surface. This mucosa in time takes on many of the characteristics of the conjunctiva, but does not become affected with trachoma.

F. H. Haessler.

15. TUMORS

Asian Perez, J. **Sarcoma or hydatid cyst?** Arch. de Oft. Hisp.-Amer., 1934, v. 34, Aug., pp. 410-419.

A case diagnosed as of hydatid cyst of the orbit was found at operation to be one of sarcoma. The author emphasizes puncture of the orbit for diagnostic purposes. R. Castroviejo.

Damel, C. S., and Rodriguez Villegas, R. **Osteoma of the orbit.** Arch. de Oft. de Buenos Aires, 1934, v. 9, June, p. 278.

At operation the case described failed to show a connection with the frontal sinus. The author doubts such origin in his case and believes the tumor originated in the orbital wall.

M. Davidson.

NEWS ITEMS

News items should be sent to the Editor by the twelfth of the month.

Deaths

Dr. Edward Ernest Maxey, Aberdeen, Washington; aged sixty-seven years, died, August 31, 1934, of coronary occlusion.

Dr. Clarence Ruter Dufour, Washington, D.C.; aged seventy-one years, died, September 11, 1934.

Dr. Oscar Beesley Dunn, Ironton, Ohio; aged eighty-four years, died, September 11, 1934, of myocarditis.

Dr. Edward Frank Ziegelman, San Francisco, California, aged fifty years, died, October 12, 1934, of angina pectoris.

Dr. Edwin J. Norris, St. Louis, aged sixty-nine years, died September 26, of pneumonia.

Dr. Eugene R. Carpenter, Dallas, aged sixty-one years, died October 9.

Dr. John R. Garrett, Roanoke, Va., aged sixty-five years, died, August 28, of uremia.

Miscellaneous

The Medical School of Washington University, Saint Louis, offers a week's intensive training in ophthalmology and otolaryngology. Only qualified ophthalmologists and otolaryngologists will be accepted for this course. The course begins on Monday, February 25 and terminates on the evening of Saturday, March 2. For information address the Registrar, School of Medicine, Washington University, Saint Louis, Missouri.

On June 2, 1934, the cornerstone of the new Canton Hospital Building was formally laid by the Mayor of Canton. The formal opening of the new building will take place in November, 1935. This will also be the one hundredth anniversary of the founding of the hospital, and of the introduction of western medicine to the Chinese by Dr. Peter Parker. The Chinese Medical Association has decided to hold its next general conference in the new Canton Hospital Building at that time. It will be an event of great historic interest to both foreigners and Chinese alike.

A Franklin Bifocal Sesquicentennial Medal has been sponsored celebrating Franklin's important contribution to the study of optics. In 1784 Franklin wrote, "I cannot distinguish a letter, even of large print, but am happy in the invention of double spectacles which serving for distant objects as well as near ones, make my eyes as useful to me as ever they were. If all the other defects and infirmities were as easily and cheaply remedied, it would be worth while for friends to live a great deal longer."

Dr. Daniel Bisno announces the opening of offices in Missouri Theatre Building, St. Louis, Mo.

Societies

The Optical Society of America held its annual meeting at the Bureau of Standards in Washington, October 18-20. An exhibit of instruments and talks by physicists, chemists and optical designers, showed the scope and variety of research work done in the field of optics since the War. The evidence was plentiful that not only has the United States achieved independence of all European sources, but it has acquired many secrets of its own which now rank American products as the finest in the world. The varieties of glass on display, the number of uses indicated and the proofs of precision workmanship were shown in the astronomical exhibit, the military display and in the numerous exact instruments for the analyzation of metals, chemicals, textiles, colors, paper and food. Ophthalmic instruments were impressive in number and uses. Hardly an industry or a science was omitted from the list of uses to which these instruments applied.

The Western Pennsylvania Eye, Ear, Nose and Throat Society, organized May 25, 1933, holds meetings on the third Thursday in May and October. The officers for 1934-1935 are: President, Dr. Claude W. McKee, Greensburg, Pa.; Vice-president, Dr. Leslie R. Hazlett, Butler, Pa.; Secretary-Treasurer, Dr. C. W. Beals, DuBois, Pa.

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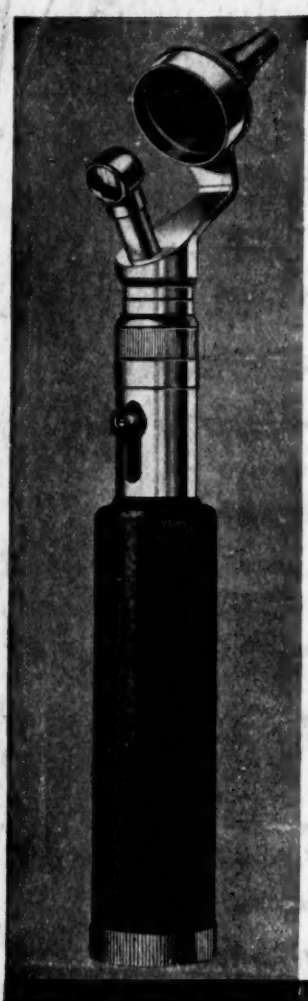

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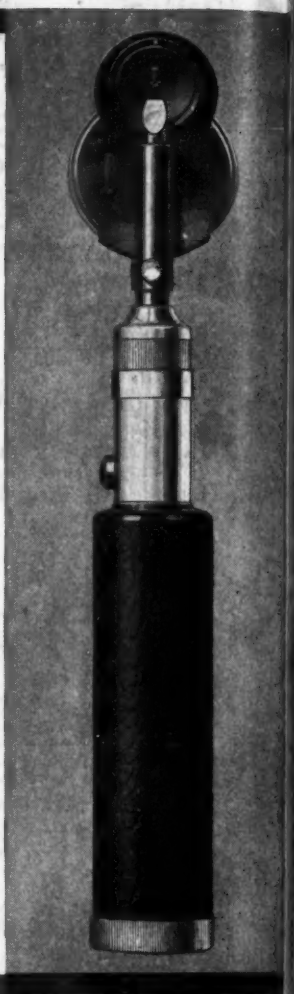

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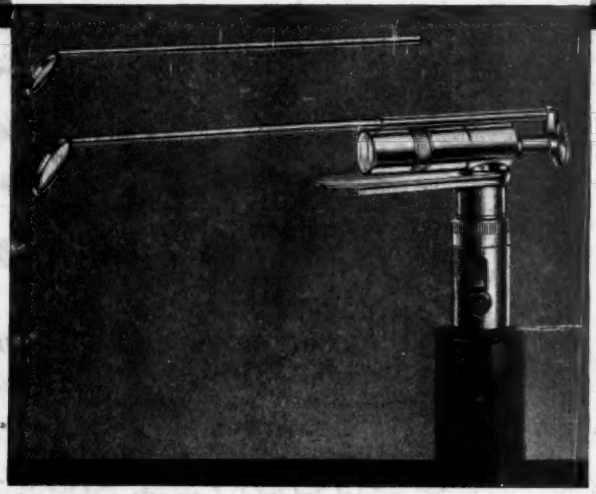
Price No. 1020 Prism Otoscope (head only) $13.50



MAY OPHTHALMOSCOPE

A totally reflecting prism replaces the ordinary mirror. This prism bends the beam of light into the patient's eye — instead of reflecting it — eliminating shadows and reducing the annoyances caused by the corneal reflex. A rheostat in the handle controls intensity of light. Lens powers from +29.00 to −30.00.

Price No. 114 May Ophthalmoscope (head only) . $19.50

NEW COMBINATION TONGUE DEPRESSOR AND LARYNGOSCOPE

Convenient if you use both instruments frequently. Quickly interchangeable. Slight pressure of thumb focuses light on any particular spot. Mirror may be turned around to any desired position. Price No. 1290 Combination Tongue Depressor and Laryngoscope (head only) $19.00

AMERICAN OPTICAL COMPANY